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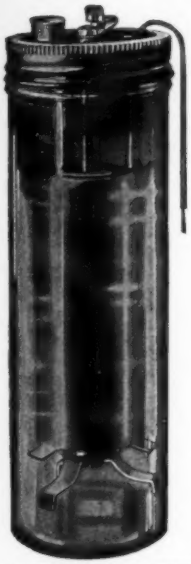
# Telephone Engineer


The Waterbury Telecell



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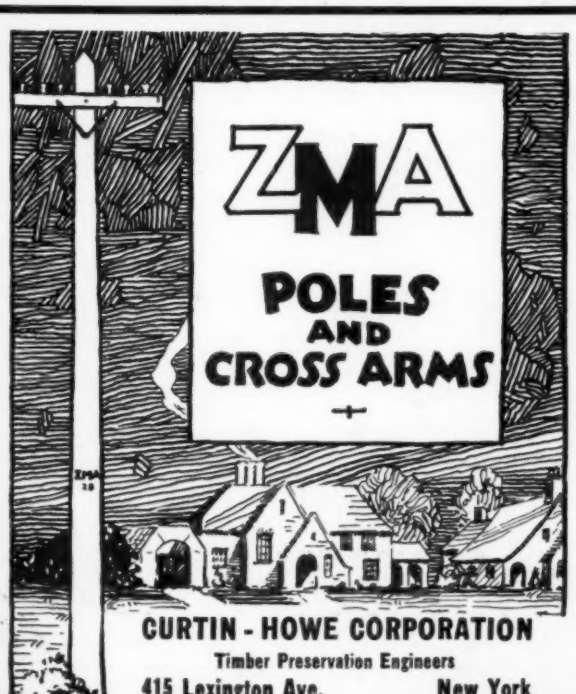

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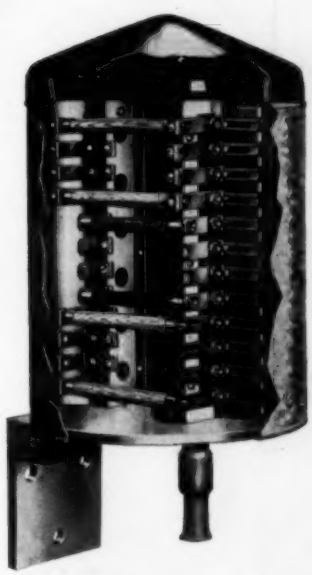

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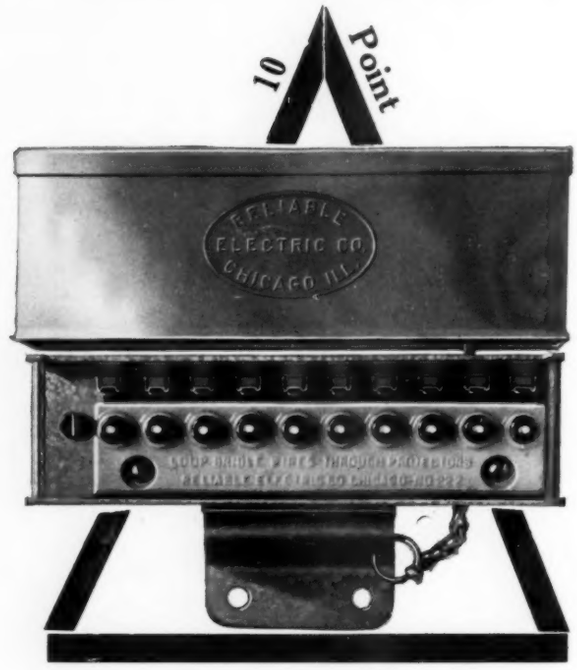


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Samples or additional information furnished on request.

Reliable Electric Company

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# MATTHEWS ADJUSTABLE REEL

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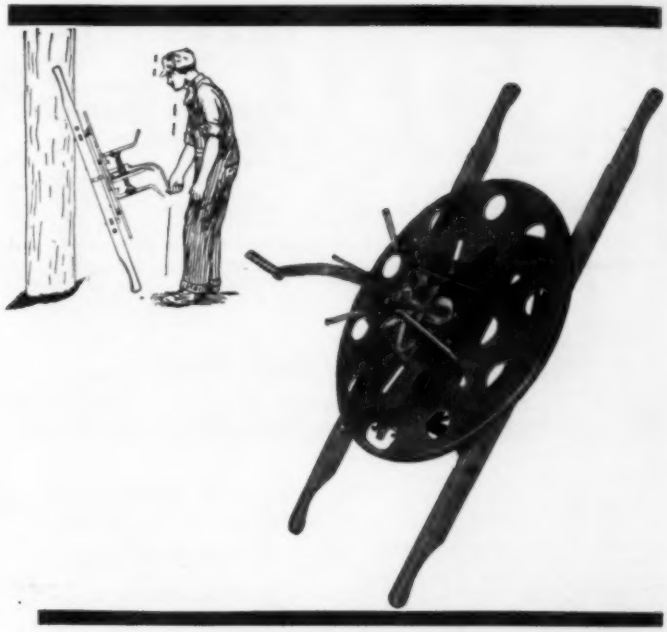

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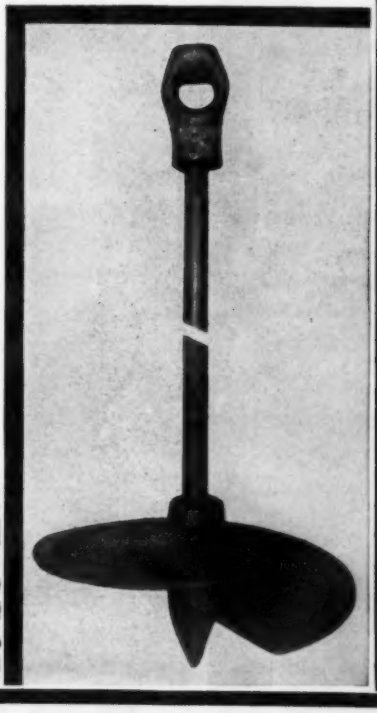

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Rod is down to full length—men still in upright position.

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## W. N. MATTHEWS CORPORATION

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# TELEPHONE ENGINEER

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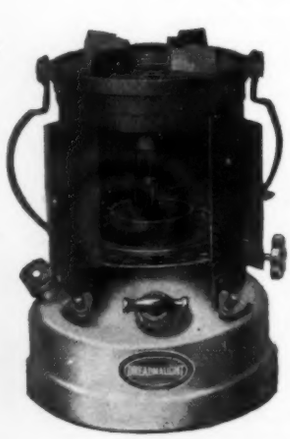

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WALL "BIG BRUTE"
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# Telephone Engineer

Volume 34 AUGUST, 1930 No. 8

**Completing the Construction Program**

Back from the woods, the mountains, the lakes, or the ocean! Grand vacation but good to be back! Lots of work to do, and where shall we start?

Vacations are of untold value in any industry, but say what you will, they do disarrange schedules. Orders and deliveries are delayed, plant changes are postponed and mistakes go uncorrected. With so much to be done we suggest a complete survey of plant equipment as a starting point.

For even while we are away our telephone plants are continually growing and frequent extensions and modifications of the existing plant must be made. Sometimes extensions are provided with the belief that they will be needed for only a limited period, and temporary methods of construction are adopted. Such a plant often is retained in service far beyond the period for which it was originally intended.

No business can stand still. If it doesn't go forward it goes backward. In the telephone business the condition of the telephone plant is a barometer of the local business. For no telephone plant can make much of an advance with a constantly deteriorating plant.

Every telephone company has some sort of construction program, although in many cases it is carried out in a "hit or miss" fashion that can scarcely be called a program.

Outside work is necessarily seasonal, especially in the north, and only the fall remains to prepare for the onslaughts of winter storms. It is time now, after making a survey of the plant, to follow that with definite plans for completing the construction program. A detailed plan should be made of the work which is to be completed before the close of the fall season, as well as for the delivery of materials required, as delays due to non-delivery of certain important items may seriously handicap the construction work and increase the cost.

In the south where the warm climate makes it possible to carry on construction work in off-months, after the crops have been cared for, it will soon be time to complete plans for the winter work.

Too much cannot be said in favor of a systematic planning and completing of construction work. The progressive and prosperous telephone company is always one which takes care of its plant periodically and thoroughly. The failing, down-at-the-heels company is one which intends to take care of its equipment next week or next month, and in the meantime continues to be satisfied with temporary changes.

---

**Inventions Boon to Deaf**

More than half a century ago the telephone was invented accidentally by Dr. Bell, who was experimenting with a device with which he hoped to aid the deaf and dumb. In the excitement over perfecting this new instrument which lengthened the hearing capacity of normal persons, the deaf mutes were neglected if not forgotten.

Improvements in electrical communication have brought about that for which Dr. Bell originally searched, although in a manner differing slightly from his plans. This has been achieved through the developments of television. For although the telephone has not been made capable of registering sound for those totally deaf it has been perfected so that deaf persons may converse by reading the lips of their conversationalist's face which is clearly reproduced in the telephone instrument by means of television.

Recently a national lip-reading champion, entirely devoid of the sense of hearing, conversed over the telephone with a deaf-mute friend, in a test conducted by the Bell Telephone laboratories. Each understood the other perfectly. Inasmuch as lip reading is dependent entirely upon the clear view of the other's face, this test has shown that image transmission has been developed to a high degree.

Another new invention has come nearer to bringing the actual sensation of hearing to deaf persons.

This is accomplished by means of vibrations received through the teeth. It was demonstrated recently by Professor Bedell of Cornell University, inventor of the device, that music almost inaudible to the ears of normal persons can be distinctly heard through the teeth.

The listener held a vibrating mechanism about the size of a baseball in his lap, and the sound vibrations were transmitted through a slender stick of wood, one end of which was held between the teeth, directly to the auditory nerves through the bone. Professor Bedell explained that the vibrations of the mechanism, caused by the sound waves, have more force although less distance than those of almost any other vibration medium, including the telephone disc.

This unique invention can be used at any time, providing it is connected with the radio or telephone, or plugged into the sound reproducers in a motion picture theater.

These new developments should lend encouragement to those engaged in the telephone industry. For although we may not always accomplish exactly what we set out to do, we can at least lay a foundation for those in the future who may find the solution to our problems.

---

**It Pays to Advertise**

It's an old adage—"it pays to advertise." But did you ever stop to think that it is not only true with regard to the fellow who pays for the advertisement but to the fellow who reads the advertisement as well?

There is another old adage to the effect that there is nothing new under the sun. Speaking most literally perhaps the statement is true. But there are certainly new ideas in the world and new ways of putting old things together—hundreds of them pop up every day. Some are discarded. Others are adopted, commercialized and advertised. And the fellow who is on his toes and who therefore makes it a point to read carefully all the advertisements related to his own business and industry, will be among the first to know about new methods, new products and new equipment.

It is an interesting psychological fact that any manufacturer, regardless of his business, hesitates to back an article of inferior quality with expensive advertising. This serves to explain rule number one, which is that nine times out of ten the reader can believe what a manufacturer has to say about his product in a paid advertisement. He tells you the truth because he knows you can call his bluff if he doesn't.

However, regardless of the advertiser's own code of ethics, Telephone Engineer has a set of ethics all its own. Before any advertisement appears in this journal, the stability of the company is checked as well as any information concerning the product, which is to be printed in Telephone Engineer. This gives rise to rule number two, which is that ten times out of ten the advertisements published in Telephone Engineer can be accepted as authoritative.

Telephone Engineer's first obligation is to its subscribers and readers and it is with a certain amount of pride that we say all our advertisements are dependable. They are written by men who are experts in the line of their particular materials and products. These men analyzed your needs and wants before they attempted to market their product. They believe and we believe they have something you want. Through the advertisements, information concerning these products are made accessible to you.

Advertisements in Telephone Engineer contain much engineering data which will benefit the individual reader as well as a telephone company. The wide-awake telephone man will be alert to catch the significance of information given in these advertisements. We urge all our readers to consider our advertisements on the basis of their definite value to you and your plant, and suggest that you apply the same judgment in reading them that you do in reading engineering articles.

---

**Cross Talk Theory**

This month we present the first of two articles which we believe will give any wire chief a thorough grounding in the subject of "Crosstalk Theory." Since crosstalk and transmission are the two most important items in outside plant consideration, we urge that every one managing a telephone plant read these articles carefully. Plant managers who are familiar with the causes and correction of crosstalk will be enabled to clear up a number of bad conditions with little expense.

Mr. B. C. Burden, Foreign Wire Engineer, Lincoln Telephone and Telegraph Company, the author of these articles, discusses the causes and effects of crosstalk in this issue. Next month he will enlarge his subject, explaining how the reduction of crosstalk on open wire circuits can be accomplished by means of transpositions.

Don't neglect this month's article by Mr. Burden. It will provide you with a clear understanding of the subject of crosstalk and prepare you for next month's valuable article, Transposition Design.

# Crosstalk Theory, Causes and Effects

**In This Article by B. C. Burden, Foreign Wire Relations Engineer, Lincoln Tel. & Tel. Co., He Explains the Causes of Crosstalk in Open Wire Telephone Lines. How to Overcome.**

### General

Crosstalk between paralleling telephone circuits is objectionable for two reasons. First, the subscriber will object to lack of secrecy on his conversations, particularly on long distance calls. Second, when two people are talking on a telephone line and crosstalk is induced on this line from some other telephone circuit the ability of the two subscribers to hear each other will be hampered by the "interfering effect" of the crosstalk. The magnitude of this transmission impairment will be greater as the crosstalk increases or as the overall transmission loss between the two subscribers may be made greater. That is, a given volume of crosstalk might make conversation very difficult over a circuit having overall equivalents of 30 d.b. (loss equiv. to 100 miles No. 109 cct.), while on a 10 d.b. circuit the same crosstalk would be little more than noticeable.

The reduction of crosstalk on open wire circuits, as will be fully explained in a September article on Transposition Design, is accomplished by means of transpositions.

Transposition design for relatively short leads consisting of only one or two arms is relatively simple, especially if the circuits are not phantomed. For long multi-arm leads carrying phantoms, such as the long distance lines over the country, the design of suitable transposition layouts is extremely complex. Standard schemes have, however, been worked out. The effectiveness of the design can be judged from the fact that the same circuits may parallel each other for hundreds of miles without noticeable crosstalk.

A very interesting story about the complexity of the transposition design problem can be found in the Proceedings of the American Institute of El. Eng. in the July, 1918, issue.

### Causes of Crosstalk in Open Wire Telephone Lines

Crosstalk between paralleling telephone wires is due to a capacity and magnetic coupling effect. These are explained as follows:

*Electrostatic Induction*—Telephone wires inasmuch as they are metallic and fairly close to each other on a lead, act very much like the plates of a small condenser. Inasmuch as the four condensers formed by the four wires of any two telephone circuits are not all of the same value because of the position of the wires on the arm, therefore an unbalanced voltage will be set up on one circuit when someone is talking on the other.

This unbalanced voltage will set up in turn a crosstalk current. This form of induction is represented in Figure 1.

*Electromagnetic Induction*—As a result of the alternating current flowing in a telephone circuit, a varying circular magnetic field of force is created around each conductor.

The strength of this field is most intense in the immediate vicinity of the conductor producing it and grows much weaker as it spreads out from this conductor.

This field in expanding and contracting in synchronism with the alternating voice current in the disturbing circuit cuts through other conductors on the same lead and thus sets up a crosstalk voltage in these other circuits. See Fig. 2.

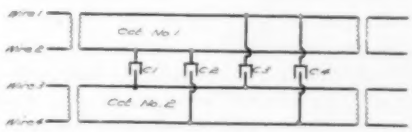



Fig 1 - Electro-static Induction

Inasmuch as the current in the two sides of a circuit is in opposite directions at any instant, therefore, the two resulting magnetic fields of the disturbing circuit will always be of opposite polarity and will set up neutralizing voltages in any paralleling circuit which they may cut. Due to the lack of symmetry between the wires of any disturbing and disturbed circuit on an open wire lead, this neutralization is not complete and an unneutralized voltage will be left on the disturbed circuit which will be effective in establishing crosstalk.

It will be shown in the article on transposition design that an effective set of transpositions creates this symmetry permitting perfect neutralization.

The crosstalk set up by the two types of induction are cumulative in open wires. It is interesting to note that what crosstalk is set up in cable result from electro-static induction only as the mutual induction unbalance between cable circuits is extremely small.

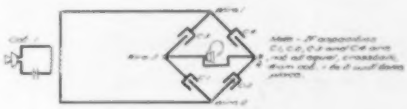


Fig 1-A. Capacity relations of Fig 1 shown in Bridge Circuit

### Convention Schedule

**United States Independent Telephone Association, Stevens Hotel, Chicago, October 14th, 15th, 16th and 17th.**

**Illinois Telephone Association, Hotel Pere Marquette, Peoria, November 12th and 13th.**

### Crosstalk Due to Other Causes

On phantomed open wire lines it is very essential that both series resistance and shunt leakage of the four group conductors be well balanced, otherwise excessive crosstalk may result. It is equally important that phantom coils be well balanced if crosstalk is to be kept low.

In connection with toll line maintenance it is customary to try and keep the two wires of a side circuit and the two side circuits within 6 ohms of each other.

Figure 2 illustrates how unbalanced phantom coils may develop bad crosstalk.

Crosstalk may also result from running phantomed lines through non-quadded cable.

### Magnitude of Crosstalk Effects

The magnitude of the crosstalk induced by one telephone circuit into another will depend upon the following factors:

1. Length of untransposed parallel.
2. Separation between disturbed and disturbing circuits.
3. Voice level on disturbed circuit.
4. Shielding due to other circuits which are located between disturbed and disturbing circuits.
5. Separation between sides of disturbing circuit, and separation between sides of disturbed circuit.

It is obvious that the greater the distance that two circuits parallel each other the greater will be the crosstalk between them. It is also evident that if they are on adjacent pin position they will set up much greater crosstalk than if on pins 1-2 and 9-10 due to the weaker

magnetic and electric field in the last core.

If the voice energy level is increased much above normal on an open wire circuit this circuit will have a greater tendency to crosstalk into the other circuits due to the stronger electric and magnetic fields.

In connection with repeated toll lines it is necessary to specify maximum levels to which circuits can be worked, so as to avoid trouble from this source.

It two pairs of wires on a telephone lead are separated by another circuit, for example, wires 1-2 and 5-6 are separated by wires 3-4; these interposed wires act

Fig2. Electro-magnetic Induction

as a shield and reduce the magnitude of crosstalk that would be experienced were they not there.

The fifth factor mentioned, namely, separation of conductors of the disturbed, and of the disturbing circuits, plays an important part in determining the magnitude of crosstalk effects.

As the spacing of either disturbed or disturbing conductors are increased the crosstalk between them will likewise increase. This is due to the fact, as previously mentioned, that the two conductors of the disturbing circuit induces voltages of opposite polarity in the disturbed circuit and these two voltages tend to neutralize each other. Neutralization would be complete were it possible for the two conductors of the disturbing circuit to occupy the same point in space. But this unneutralized portion will become larger and hence the crosstalk larger, as the spacing of the disturbing circuit increases. For example, if parallel wire were substituted on pin 2 for conductors 1 and 2, the crosstalk would be much less from this circuit to a circuit on pins 3-4 than if the regular open wire circuit were there.

The great difference in the magnitude of the crosstalk set up by grounded as compared to metallic lines results from the fact that the sides of a grounded circuit are 25 ft. apart (assuming that the current returns through the ground near its surface) as against 12 inches for the separation between the sides of a metallic circuit.

### Crosstalk Units and Measurements

The large telephone companies operating long distance lines long ago devised apparatus and established units for the measurement of the crosstalk on their lines.

This was necessary so that crosstalk standards could be established to which lines could be maintained. These standards were so established as to insure that crosstalk would not be tolerated which was sufficiently loud to permit loss of secrecy, nor to be disturbing to a long haul connection where the losses might be high.

The unit used in crosstalk measurements is known as the *"crosstalk unit."*

One crosstalk unit equals a current ratio between disturbed and disturbing circuits of $.00000I \times 10^8 = I$; i. e. $\frac{I_1}{I_2} \times 10^8 =$ crosswalk units where: $I_1$—current in disturbed circuit. $I_2$—current in disturbing circuit.

It was formerly the practice to keep the overall crosstalk on toll lines down to 1,500 units.

That is, 1,500 units was considered the maximum crosstalk which should be permitted on lines if they were to be operated at the desired standards. This limit has recently been reduced to 1,000 units on all important toll circuits.

A proper conception of the magnitude of these established standards can best be obtained by considering them in terms of transmissing (d.b.'s).

For example, 1,500 units of crosstalk would have a volume approximately equal to that which would exist over a line having a transmission equivalent of 56.6 d.b. and 1,000 units to that over a 60 d.b. line. (This conception assumes the volume would be equivalent provided standard subsets with zero efficiency were used on the two lines mentioned.)

Inasmuch as the limits of satisfactory commercial transmission is 30 d.b. it is evident that the volume of crosstalk on lines maintained to these standards would be so weak as to pass unnoticed.

### Crosstalk Measuring Sets

The average independent exchange can seldom justify a crosstalk measuring set, except where a large number of toll circuits must be maintained.

Considering city and rural plant only; if open wire and drop wire are kept free from grounds, high resistance joints, and leaks between wires. If the cable insulation is properly maintained and if phantom circuits are not worked through long non-quadded cables, and if the open wire plant where parallels of several miles occur, is adequately transposed there should not be any crosstalk to measure.

With toll lines the problem is different as each line may be considered a link in a long chain and it is important to know that this link is as strong as the rest of the chain if universal service is to be given. Toll lines because of their length and the fact that they usually carry phantoms are prone to develop crosstalk even though they may be transposed to a definite scheme. This results for the most part due to errors in cutting in transpositions, high resistance joints, etc.

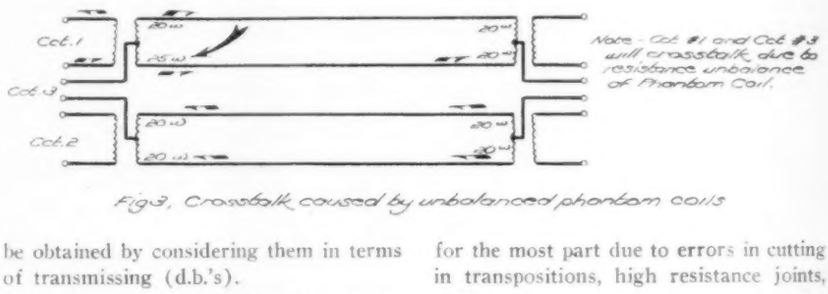



Fig3. Crosstalk caused by unbalanced phantom coils

For the interest of those who are not familiar with crosstalk measuring practices the methods ordinarily used will be described.

A crosstalk measuring set consists essentially of a variable resistance shunt, headphones, keys, and two repeating coils with tapped primaries. In addition to the measuring set a source of testing

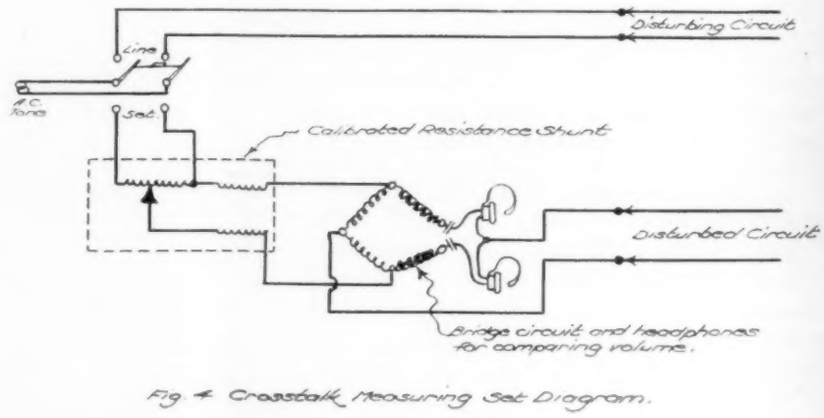



Fig. 4 Crosstalk Measuring Set Diagram.

(Continued on page 42)

# Modern Telephone Storage Batteries

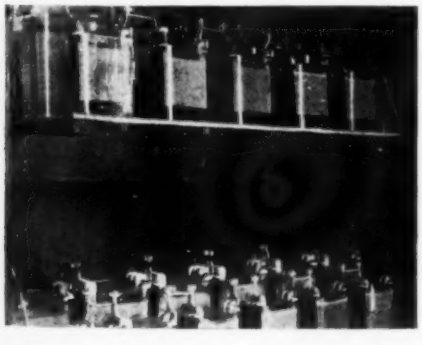
**In This Second Installment Ray Blain Discusses Battery Installation, Charging Method, Constant Current Method, Constant Potential Method, and Equalizing the Charge**

*(Continued from July issue.)*

**Battery Installation.**

Until quite recently all telephone storage batteries were of the open jar type, which were shipped knocked down and required assembly and long initial charge at the point of installation. All this required a certain amount of skilled labor or supervision if the performance of the battery was to be guaranteed. Also with the open jar cell evaporation was always excessive and loss of electrolyte by spray was common. This spray also made the keeping clean of the battery room a difficult task. Then again, the battery room or cabinet must be well ventilated, which is not always an easy matter.

While it is believed that the new sealed jar type battery is far superior to the old open cell type it is also realized fully that there are in service many of the latter type in telephone exchanges where they are giving wonderful service and will continue to do so for many years to come. Also in many main automatic exchanges where the "G" or "H" type cells are required sealed jars of course would be impossible at this stage of the game. It is believed, however, that in a small or medium sized exchange where a new battery is going to be installed that the sealed jar type should be given



*Old style telephone battery installation. Note moisture on outside of cells.*

primary consideration. When open cells are installed good ventilation should be provided if possible. In most cases forced draft fans will be required. Acid fumes are very detrimental to the ordinary electric fan and I have found only one, the new propeller type that gives dependable service in the outlet vent of a battery room.

After the room is well ventilated the walls and floors should be thoroughly painted with acid proof or acid resisting paint. The cheap, so-called acid proof paints should never be considered as they soon scale off and are worse than useless. Before starting to repaint a battery room thoroughly wash all surface with a strong solution of bi-carbonate of soda.

Any color scheme can, of course, be used in the battery room, but black is the one generally used. While this is satisfactory the following has been used extensively by some of the larger companies and is much to be preferred to the dingy black. Paint the walls from a line about four or five feet above the floor and the ceiling white. The sidewalks below this line to the floor are painted an olive color or what might be called an automobile body green. Floors should be painted gray color. Black seems to be the best for battery racks and tanks. Special thinner should be ordered with the black paint to insure results. All surfaces should receive three good coats of paint. Except on battery racks and tanks it is considered a good plan to first put on a flat coat, a second coat of a mixture of half flat and half enamel and the third coat all enamel. The green on the lower sidewalls has been found to be very good as acid fumes settle down and it seems to have more resistance against them than the white. White paint after being in service for a number of years may turn to a color which is a cream and not unsightly. Any metal surface in the room, such as copper bus bars and lugs, should be painted with three coats of "Hippo Protective Oil." Other metal surfaces, such as conduits and fittings, should be protected with a good acid resisting paint suitable for use on metal.

A good preservative for painted surfaces in the battery room is to thoroughly wash them about twice per year.

Development and improvement of apparatus is fast eliminating many of the hard working telephone man's worries. Perhaps the greatest improvement, or at least one which is being more generally accepted, is the sealed jar type storage battery and the trickle or floating method of charging. I have every reason to believe that in the not far distant future all of the small and medium sized exchanges will make use of these batteries and will employ one of the small trouble proof rectifiers to keep them fully charged at all times. The assurance of a continual supply of pure direct current always available without fuss or bother is an advantage that will not be passed up long by the progressive telephone managers and I believe this type of manager is in the majority.

**Charging Methods**

While the sealed type storage battery is recognized as being far superior to any type of battery heretofore designed for telephone purposes, it is just as important that they be properly maintained as was the old style open jar types if they are to give maximum life and service.

The manually cycled methods of charging will be considered first briefly, then the newer method of floating or trickle charge in detail as it is rapidly coming into general use. The manually

*The above shows a "close-up" view of Modern Telephone Battery*

cycled method of charging as referred to in this article is the method whereby the battery is permitted to reach a certain state of discharge before being placed on charge again manually. With the manually cycled method, either the constant potential, the constant current or a modification or combination of the

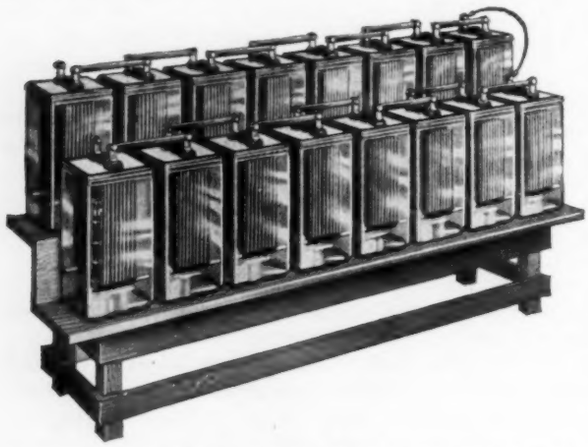
two must be used, which will be explained briefly as follows:

**Constant Current Method**

With this method the current is held constant by means of control of the charging source or by an adjustable resistance in series with the battery. As the charge progresses, adjustment of this resistance keeps the current constant as the voltage increases. With this method the battery is generally charged at the normal or eight-hour rate until gassing starts, when the current is considerably reduced. The finishing rate is generally about 40 per cent of the starting current.

**Constant Potential Method**

This method is one whereby the voltage is maintained at a constant value for the duration of the charge. With this system the value of the starting current on a discharged battery is considerably in excess of the normal rate. As the charge progresses the voltage increases and the current tapers until it is much below the normal rate at the end of charge. However, the average current during the complete charge will about equal the normal rate.



*The new style installation shown above gives an ideal set up for medium size exchange*

I personally prefer a modification of the constant potential method of charging if the charge discharge method is used. This can be accomplished by inserting a suitable resistance in series with the battery or some other arrangement which will limit the current at the start of the charge. Later this resistance is cut out of circuit after the voltage has built up and the current permitted to taper to the end of the charge. This avoids the possibility of excessive gassing at any period of the charge which wears away the active material and reduces the useful life of the battery.

**The Equalizing Charge**

Regardless of which method of charging is used, the battery must be given an equalizing charge at fixed intervals. A simple safe rule to follow is to make this charge weekly if the battery receives a regular charge daily, and every two weeks if the battery is charged less than daily. If the battery is charged only once per week, then make every other charge an equalizing one. This charge should be continued until neither the specific gravity nor the voltage shows an increase over a period of five readings of the pilot cell taken at 15-minute intervals. The purpose of the equalizing charge is to bring cells up which have fallen below normal on the regular cycles of charge and discharge.

**Trickle Charge or Floating Method**

Until quite recently it was considered necessary that a battery of the lead acid type receive its regular cycles of charge and discharge to insure maximum life. At the present time battery manufacturers are urging that their batteries be given the least possible amount of charge and discharge possible to insure better service and longer life. With the trickle charge system the battery is charged at a very low rate for an extended period. The rate of charge is carefully adjusted so that the amount of charge will, at least equal the amount of discharge over a period of 24 hours. The lowest possible rate should be used that will give this result. Before the trickle charge is started the battery should be given a good overcharge. Care must be taken in adjusting the charging rate so that the specific gravity will be maintained approximately within five points of the maximum reached on the overcharge.

The voltage method may be used by connecting a correctly calibrated voltmeter directly across the battery terminals and adjusting the current until the meter reads 2.15 volts per cell at 80 degrees F. If the rate is low, the gravity will fall, and if high it will rise. Reduce the rate until the gravity will remain about constant at the required value. If the battery gasses constantly it is receiving too much charge. Rapid evaporation of the electrolyte making the addition of water frequent is also an indication that the charging rate is too high. Ordinarily the voltage of the charging source should be maintained between 2.10 to 2.20 volts per cell at all times. On holidays or Sundays, when the exchange load is light, the gravity may show a considerable increase but the rate should not be altered, for an increase above the normal load after such periods generally takes place which takes care of this excess. A period of at least one week should be considered when deciding on a suitable trickle charging rate, for the gravity will generally show a decrease during the later part of the week and be slightly higher than normal on Monday morning, while the average for the period will be about correct.

A very good plan when the trickle charge system is used is to equip the power panel with a charge-discharge ammeter. We have such an arrangement on a small automatic system where the trickle charge method is used, and it has proved quite satisfactory. With this arrangement, when one connection is up on the system, the charger is handling the load and the ammeter reads zero. When a second connection goes up, the ammeter reads about 1 ampere discharge, and when both connections are released the ammeter reads 1 ampere charge. We have found that the 1 ampere charging rate on this particular system keeps the gravity up to the desired point without gassing, evaporation is practically nil, and there is every indication that the battery will give wonderful service for years to come.

**Maintenance and Records**

With the trickle charge system daily specific gravity and temperature readings of the pilot cell should be taken and recorded. Individual cells should be read and the proper records made at least weekly. These records will give timely indication of approaching trouble in any particular cell. The level of the electrolyte should be maintained at the correct point at all times. The new type cells usually have the electrolyte level indicated by a suitable marker. A battery syringe is the most suitable method of adding distilled water to replace evaporation. The pilot cell should be well marked so that it can be easily seen and read. If cells are not equipped with gravity indicators, a good grade of syringe hydrometer should be used. This instrument should have a tube large enough to permit the hydrometer floating freely and should hold a suitable volume of electrolyte. The electrolyte taken out of a particular cell for testing should always be returned to the same cell. Care should always be taken to keep the surface of the cells dry and clean at all times.

**Advantages of Trickle Charge.**

In a telephone system one of the most important functions of the storage battery is to act as a reserve to carry the exchange over a failure of the commercial power supply. By keeping the battery always fully charged a larger number hours reserve capacity is always maintained for emergency use.

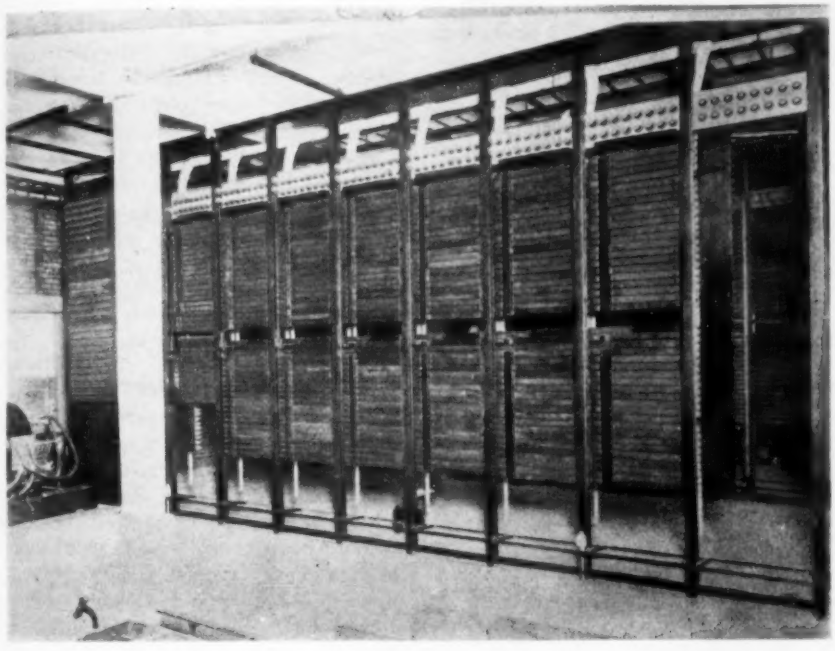
As the greater part of the operating current is furnished directly to the

(*Continued on page 22*)

# Relay Strip and Rack Layout

**Second Installment of Straightforward Trunking System**
**by John H. Levis, Jr., Telephone Engineer, Stromberg-Carlson Telephone Manufacturing Co., Rochester, N. Y.**

The trunk and common relay equipment is located in the relay bay racks in the terminal room. The trunk relays are mounted, one complete circuit per relay mounting strip, including repeating coil and condensers.



*Front view of typical trunk relay rack in straightforward trunking system*

Each trunk circuit plate has a local cable form soldered completely to the relays, repeating coil and condensers.

The wiring that is necessary to terminate on other points outside of the trunk relay circuit plate, such as a battery and ground, incoming trunk line, cord, lamps, etc., are terminated on a screw type terminal strip mounted on the right hand end of the circuit mounting plate on the cable form side.

The outside terminating points are terminated on two removable terminal shoes, per trunk, that fasten on the trunk screw terminal strip. The advantage of this type of layout is that all trunk circuit plates can be wired up completely and tested in the factory. Another advantage is that it can be removed from the commons so that the trunk position can be operated if a serious case of trouble develops in a trunk circuit. It is customary in some plants to remove the entire relay mounting from the relay rack and place it into a routine tester in order to locate and clear the trouble.

The relay equipment is covered with a gang relay casing, all relays being exposed when the casing is removed.

The forty trunk relay equipment and common relay equipment is mounted on one relay bay. The common relays are mounted in the middle of the bay between the twentieth and twenty-first trunks. This is done so that they can be moved conveniently in case of common relay trouble as they are not removed from the position when trouble develops.

At the top of the trunk bay are mounted the generator resistance lamps and other miscellaneous position equipment. Rolling ladders are used in maintaining the equipment. Individual alarm fuses for each circuit are used.

### Relay Equipment

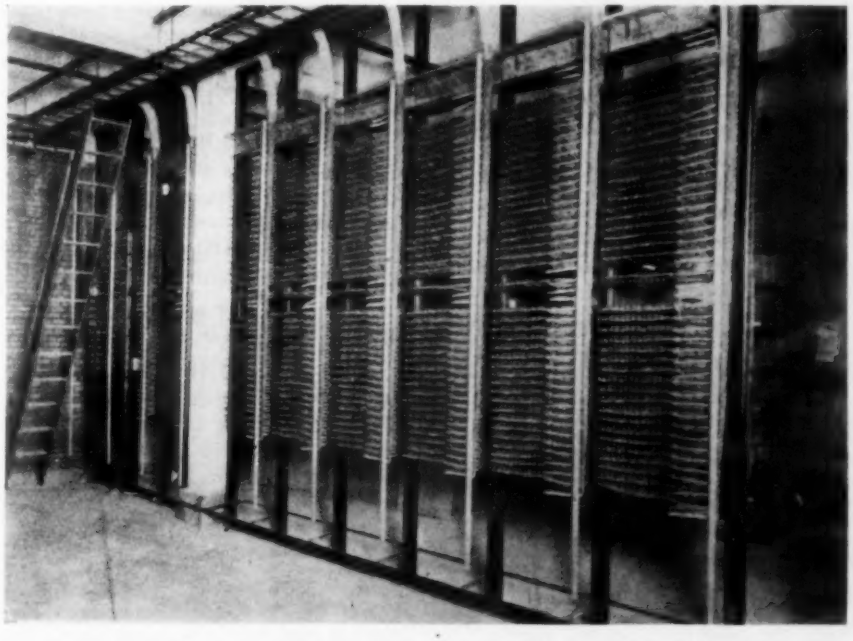
The relay used in all of the circuit designs is the Stromberg-Carlson 200-type, which has the angle type armature.

This relay is designed so that the armature can be removed from the frame and the springs very easily by lifting the armature from the pivot points, which are on the sides of the return pole of the relay and upon which is mounted the contact spring assemblies.

The armature is equipped with an adjustable residual screw and lock nut. A small screw near the top of the armature is used to hold it in place so that it will not jar out of place in shipment.

The armature air gap or armature travel is permanent after it is once adjusted and cannot change during relay operation.

The relay is designed so that a coil may be withdrawn without removing the wiring from the contact springs, it being



*Rear view of typical trunk relay rack in straightforward trunking system*

only necessary to remove the wiring from the coil winding. The angle return pole piece, upon which the spring contacts are mounted, is fastened to the relay mounting strip independent of the coil. The coil is fastened at another point. This has proved advantageous in cases where coil trouble developed.

The relay springs are nickel alloy and of sufficient length and thickness to have proper flexing and contact separation. The contacts are at the extreme end of the springs in order that proper gauging and inspecting can be made.

The contact springs are adjusted with the standard spring adjusters or spring venders.

The coil winding space is of sufficient size to accommodate a winding that will meet all circuit requirements with a very few exceptions. The cores used are of a good grade magnetic iron, which is properly annealed.

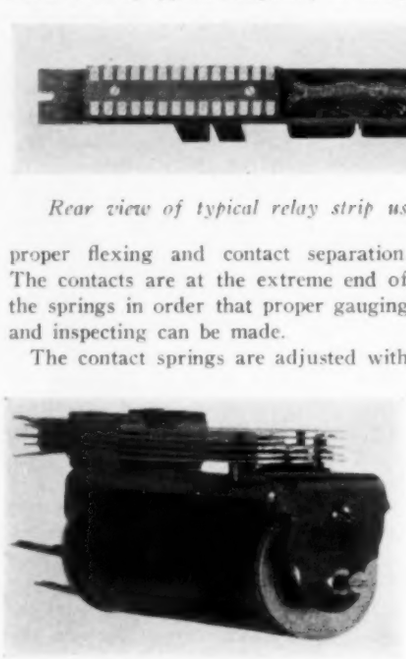
All windings are wound according to turns and are checked for resistance within certain limits. Proper insulation is used and the windings are properly covered to prevent mechanical abrasions. All iron parts of the relay are protected against rust by the Parker rust-proof process.

The relays on the circuit plates are adjusted by the current flow and mechanical method at the factory for installing.

The repeating coil is the concentric wound type, which is properly balanced. The core laminations are of the flat double window type and are made from annealed silicon steel. The condensers are of the standard tin foil paper type of four microfarad capacity.

*Front view of typical relay strip in straightforward trunking with relay case removed*

*Rear view of typical relay strip used in straightforward trunking system*



*Stromberg-Carlson 200-type relay used in Straightforward Trunking system*

## Modern Telephone Storage Batteries

(*Continued from page 20.*)

equipment, the power plant efficiency is considerably increased. In other words, during the greater part of the day the operating current is being supplied by the charger and the battery is at rest

The reduction of the wear on the active material by the constant charging at a low rate is far below that of the usual manually cycled method and the life of the battery is considerably increased.

I know of a case where an inexperienced attendant completely ruined a new set of batteries in less than a year by excessive charging. This charging for long periods at a high rate caused the positive plates to crumble and fall to the bottoms of the jars. With the trickle charge method this injury could not have happened providing the charging rate was correctly set and was not altered, no matter how inexperienced the attendant might be. Unauthorized people should never tamper with or make adjustments of a trickle charger after once placed in service. If this rule is carried out there need be no fear but that the battery will give maximum life and service.

## WISCONSIN HOLDS ANNUAL MEET

The annual convention of the Wisconsin Telephone Association was held at the Schroeder Hotel, Milwaukee, August 5-6-7.

Because of the intense heat and the fact that Milwaukee is so far from the center of the telephone activities in that state, a small attendance was recorded. Those who did attend, however, were made to feel that the time was well spent. An excellent program was prepared and subjects discussed that assisted the alert telephone man in his problems.

Conditions over the state were very satisfactory and, while business conditions were below normal, it was indicated that telephone companies had shown a steady increase during the year.

A very interesting dinner entertainment was enjoyed by probably a hundred guests on the evening of August 6th. The entertainment was furnished by local talent, most of whom were employees of the Wisconsin Telephone Company. Two unusually entertaining musical numbers were rendered, one by Miss Germaine Stell and another by Miss Marianne Wetzel; other features were numbers by the quartet composed of Joseph Fuss, Howard Phair, William Lynch and Frank Zingsheim. Robert Coe, Jr., also participated in the entertainment.

No change was made in the board of directors for the coming year.

President Gallon's address is printed elsewhere in this issue.

## SHOEMAKER CHOSEN PRESIDENT

Fred I. Shoemaker assumed the duties of president of the Standard Public Service Company and its subsidiaries on August 1, succeeding A. Arthur Jenkins, whose resignation took effect on that date. Although Mr. Jenkins was located in New York City, Mr. Shoemaker will have his headquarters in Columbus, Ohio, where the general offices of the company are situated.

Mr. Shoemaker has been identified with the telephone industry since 1901, both with Bell companies and Independent companies. For a number of years he has been in charge of properties in Pennsylvania and New York state.

The Standard Public Service Company is operating telephone properties in Ohio, Kentucky, Indiana, Illinois, Iowa, Missouri, Oklahoma and Texas, and water properties in New Jersey, West Virginia, Ohio, Indiana, Oklahoma and California.

## SHANGHAI TELEPHONE COMPANY ACCEPTS I. T. & T. CONTROL

New York.—Announcement has been made by the International Telephone and Telegraph company that its offer for control of the Shanghai Mutual Telephone company has been accepted by stockholders of the latter. The transaction has also been approved by the council of the French and international settlements of Shanghai, in which zones the company operates. The company serves a population of 50,000 foreign and 1,500,000 native. International Telephone and Telegraph has been installing rotary automatic equipment in the Shanghai Mutual.

# The Various Kinds of Carrier Current Systems

**In This Article by F. J. Dommerque Is Described Carrier Current Systems in Practical Use by the American Telephone & Telegraph Company, as Developed by That Organization**

### Classification

The American Telephone & Telegraph Company, which owns practically the entire long distance network in the United States, has classified the carrier-current systems according to the progress in their development. Thus the first system was designated by A, the second by B, the third by C and the fourth by D. There surely are more to follow.

All of these systems are two-way systems, that is, one can talk both ways, the same as in the ordinary telephone system. The type A system is a four-channel system, that is, a system providing four carrier current channels in addition to the regular voice frequency channel. In this system the carrier is suppressed. The type B system is a three-channel carrier transmitted system. The type C system also is a three-channel system but has its carrier suppressed. The type D system finally is a single-channel carrier suppressed system. From this it seems that the suppressed carrier has proved itself as the most advantageous.

The goal the developers of these systems strived to reach was the most economical system to operate. The most economical system is the one which gives transmission over a maximum distance at a minimum cost. This does not mean that each consecutive system of the four enumerated above permits transmission of speech over a greater distance than the one designed before it; it means, that a system designed for a certain number of miles, or better expressed, a system designed for *short toll* lines to be economical must give satisfactory transmission of speech on *toll* lines at a minimum cost, while a system designed for what is commonly designated as *long-distance* lines is then the most economical, when it transmits speech farther than any other system for the same outlay of money.

In the above classification only the principal items of distinction are given; there are other items, as for instance, the use of the same carrier frequency in both directions, or of one frequency for transmission in one direction and a different frequency in the other direction. In our discussion we will follow the path of advancement; as this is written after the four Bell systems had been developed, we can profit by the experience of this development. Consequently our discussion will start with the most simple layout and proceed to the complicated arrangements gradually adding new points on our way.

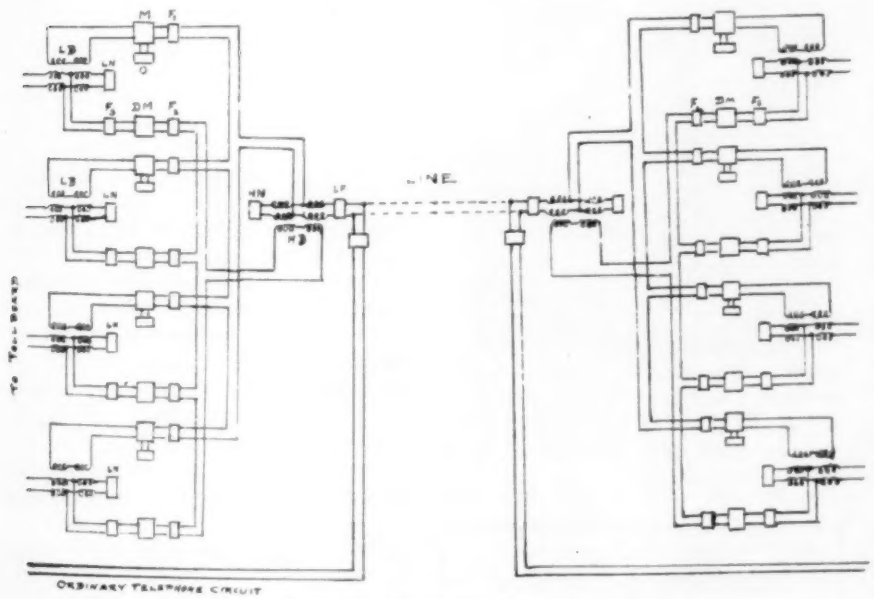



*Fig. 1—Two-way Four-Channel carrier system*

### Two-way Transmission

A subscriber can talk on an ordinary telephone line both ways, because when he talks, no other person is talking on the same line. This is different on a carrier line. In a carrier line the modulator combines the speech frequencies and the carrier frequency by means of a vacuum tube at the sending end, and the demodulator disassociates the two kinds of frequencies again at the receiving end. Thus we can talk over a carrier line, providing the modulator is furnished with the proper carrier current by an oscillator or high frequency machine, and the speech currents after having been reproduced by the demodulator are properly amplified. But we cannot talk over such a line both ways, we need two such lines, as they work in one direction only. To obtain a complete conversation, there must be provided at the sending end a modulated and oscillator for talking and a demodulator for receiving, and the same provision must be made at the receiving end. These requirements can only be fulfilled by providing two lines or two channels for the carrier, one to operate one way for sending and the other one operating the other way for receiving except we find a way to use the same line for transmission both ways, that is, find some means of selecting, when two persons talk over the same line, the proper range of frequencies; filters will do it.

We are already familiar with the various types of filters; we also have discussed, but only briefly, the terminal condition of a two-way carrier channel, of which Fig. 3 in the preceding article gave an illustration. Therefore, we can now show a schematic of a carrier channel with the filters inserted and discuss the filters themselves afterward.

Fig. 1 outlines the requirements for a four-channel carrier system, consisting of the ordinary telephone line and four two-way carrier channels, all of which operate over one and the same line. The ordinary speech frequency channel needs only protection against the high frequency used in the carrier channels flowing back into the telephone circuit, for which purpose a low pass filter is inserted of the description shown in Fig. 3 of the preceding paper. Such a filter is required at the sending as well as at the receiving end.

Each one of the four carrier channels is connected at each end to the tollboard by means of a hybrid transformer of

which we have also spoken in the preceding paper; the balancing network associated with these transformers must simulate as near as it is possible the low frequency circuit, to which the transformer connects.

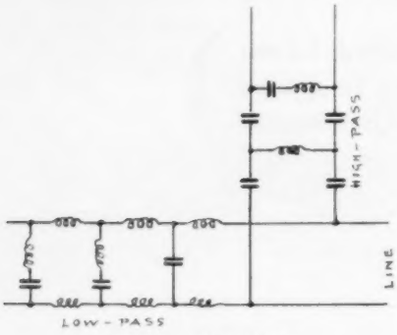



*Fig. 2—Line filters*

At the transformer each one of the four carrier channels divides into a transmitting and a receiving circuit which are easily distinguished by their modulators M and their demodulators DM, as the modulators M in the transmitting circuit have the oscillators O (or any other high frequency generator) connected to them. In the figure the transmitting end is shown as the upper branch and the receiving end as the lower branch of each carrier terminal.

Taking first the upper branch, the circuit proceeds from the hybrid transformer to the modulator M; thence passes through a band filter F, which passes one side band and the carrier. All the upper branches combine and pass through another hybrid transformer, common to all of them. Associated with this transformer is a balancing network which simulates the line impedance; this is designated in Fig. 1 by HN, while the low frequency balancing network is designated by LN. The bridge formed by the transformer and the carrier line balancing network prevents the modulator output to reach the input of its associated demodulator.

Before entering the line the common carrier passes through a line filter LF, which is a high-pass filter and transmits all frequencies above the speech frequency band and attenuates all frequencies below it.

At the other end of the line the ordinary telephone channel passes through a low-pass filter to the local switchboard. The carriers pass through the high-pass line filter into the bridge-circuit and thence selectively through the appropriate band-filters $F_2$ (which act as a block to the return of the demodulator output current on itself) to the demodulators. From the demodulators the speech frequency current after being amplified, passes to the switchboard, which will be the tollboard, where, however, the carrier frequency circuits are grouped by themselves.

We now will say a few words about the filters. In our previous paper on electrical filters (January, 1930) we have described the low-pass filter, the high-pass filter and the band-pass filter in its simple form, presenting one section of each kind. We also have stated that the sharpness of attenuation-line is accentuated by the number of sections in the filter; the more sections the sharper the division line. Taking this into account it will be found that practice has determined the design of filters to a great extent, particularly in respect to the number of sections.

In Fig. 2 are shown the low-pass and

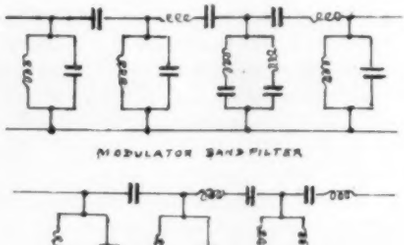



*Fig. 3—Modulator and Demodulator band filters*

high-pass line filters used at each end of the line in the type D carrier system. This combination of filters is sometimes called a "high frequency composite set." In Fig. 3 is presented a diagram of the modulator band filter and the demodulator band filter of type D system. In Fig. 1 the filter $F_3$ inserted in the output circuit of the demodulator is a low-pass filter to prevent currents of frequencies higher than the speech frequencies from being transmitted to the subscriber. It may be mentioned that the range of speech frequencies to which reference has been made in these explanations, pertains only to the most essential frequencies which reach their upper limit at about 3,000 cycles.

## Stromberg-Carlson Paragraphs

### W. J. Pfaender on Vacation

W. J. Pfaender, representative in Peoria, Illinois, for the Stromberg-Carlson Telephone Manufacturing Company, has just returned to Peoria from a two weeks' vacation in New Ulm, Minn.

### E. C. Roworth Completes 25th Year with Stromberg

E. C. Roworth, Treasurer of the Stromberg-Carlson Telephone Manufacturing Company, completed his twenty-fifth year in the service of that company on July 17, 1930.

### J. P. Galligan Proud Father of Baby Girl

J. P. Galligan of Stromberg-Carlson's Kansas City office is the proud father of a nine-pound baby girl. Miss Galligan arrived the first week in July.

### C. D. Kinne Takes Long Business Trip

C. D. Kinne, Kansas City office of the Stromberg-Carlson Telephone Manufacturing Company, has just returned to Kansas City after a trip through Nebraska and Texas. While in Dallas Mr. Kinne visited the new office and display room of M. C. Schoenly, Inc., 903 Allen Bldg., Commerce street at Ervay, Dallas, Texas.

### Newfoundland Company Selects Stromberg Equipment

The Avalon Telephone Company, Ltd. of St. Johns, Newfoundland, has just contracted for a 700 line addition to its present switchboard and a 500 line Super-Service Switchboard for its Belle Island Exchange, with the Stromberg-Carlson Telephone Mfg. Co., according to word received from that company. R. J. Murphy is Managing Director of the Avalon Company, and J. D. Cameron is Secretary and Treasurer.

### Bolivar, Missouri, Installs Switchboard

The Directors of the Polk County Mutual Telephone Company of Bolivar, Missouri, which recently placed their order with the Stromberg-Carlson Company for new central office equipment, advise that the new equipment is now installed and that their subscribers are enjoying the greatly improved service.

The new equipment consists of a standardized Stromberg-Carlson No. 105 switchboard equipped with 160 lines and complete with all new arrester equipment. Various other improvements in the central office were also made at the time of the installation.

### Stromberg Magneto Board Installed by Company

The first Farmers Telephone Association of Langsford, N. D., has just installed a new 105-C Stromberg-Carlson magneto switchboard. The Association has made other improvements including the laying of 5,000 feet of cable. Included in its telephone are 18 No. 1177 Stromberg-Carlson Hand Sets with magneto boxes.

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Ray H. Manson, vice-president and chief engineer of the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., has taken time off from his many duties at the Rochester plant to take a motor trip through the New England states. Mr. Manson will spend most of his vacation at the Maine Coast Resort.

# Furnishing Modern Service to a Small Community at a Profit

E. R. Stonaker, Consulting Traffic Engineer, Stromberg-Carlson Telephone Manufacturing Company and Rochester (N. Y.) Telephone Corporation

*(This paper, when first read at the 1929 Convention of the Iowa Independent Telephone Association, was referred to by officials of that association as follows: "The paper, 'Furnishing Modern Telephone Service to a Small Community at a Profit,' outlines a plan of action which should be regarded as the keynote of the activities of this association, as it might well be of any Independent Telephone Association." That it contains recommendations which might well be acted upon by telephone operating men to the mutual benefit of all concerned is further testified to by the fact that another prominent telephone official operating in a field widely removed from the one previously mentioned remarked after reading this paper, "I think the plan of action proposed offers about as much opportunity to better the general overall telephone service as any line of endeavor that I can think of."*

*It has created a great deal of interest and discussion at all of the following State Telephone conventions at which it has been presented during the past year: Arkansas, Iowa, Kansas, Maine, Minnesota, Nebraska, New Hampshire, New York, Oklahoma, Pennsylvania, South Dakota, Texas and Vermont.)*

A year or two ago we, in the telephone business, awoke to the fact that there were over 20,000,000 automobiles in servicee in the United States representing an average investment of something like $1,000 each and an average service cost of $400 or $500 each as against some 18,000,000 telephones, representing an investment somewhere around $150 each and a service cost averaging somewhere around $30 per year. Approximately that same ratio is still in effect.

Isn't that a challenge to us telephone operating men?

What is the reason for the existence of this situation?

It is as our National Association President, Mr. MacKinnon, has pointed out in many of his recent talks, that during the World War production in every field, except the public service field, was increased manifold to meet war demands.

Public service production was curtailed wherever possible to make room for war production.

We formed the habit of selling service only to meet demand.

After the war the huge plants, built for private enterprise and representing huge outlays of capital, had to be kept running and outlets had to be found for their goods.

This was especially true of the steel and automobile business.

What did the men in that business do? They began to merchandise their product, to improve it to such an extent that everybody wanted first just an automobile, then a better automobile, then still a better one, etc.

*E. R. Stonaker, Consulting Traffic Engineer, Rochester Telephone Corp., Rochester, N. Y.*

In other words, they sold to meet production, not just to met demand.

In the meantime, what did we do?

We just sat still, like a bump on a log and merely sold to meet demand—stuck in a telephone here, a piece of wire there, another strip of jacks in the other place, etc.—held down by a mental and physical inertia from going out after the business which is lying around just waiting for us to go after it.

As an illustration of what can be done if a telephone company will just go out after business, I will cite the case of the Rochester (N. Y.) Telephone Corporation with which I am associated in a consulting capacity. They put on a two-weeks' campaign among their employes for new subscribers. A quota of 1,600 was set. The total new subscribers signed up was over 3,600. The details of this campaign are ably presented in an article by Mr. Frank Byrne, commercial superintendent of that company, in an article published in Telephony of April 13, 1929.

We, in the telephone business, have been complacently patting ourselves on the back on the growth of our Modern Carpet of Bagdad over the past 50 years or so, where in reality someone should have been hitting us over the head with a club for allowing an industry about 30 years old to breeze by us like a thoroughbred past a selling plater.

And, if we don't get busy, many another infant business is going to breeze by us the same way.

I was very much interested in noting the other day, while examining the latest report of World's Telephone Statistics issued by the American Telephone and Telegraph Company, that there was such a wide variation between the telephone development in the larger cities in this country and that in the smaller communities. Those figures compare as follows:

Cities of over 50,000 population—Telephone development, 21.8%.

Cities of less than 50,000 population—Telephone development, 12.6%.

The Independent telephone operating group operates for the most part in the smaller communities. Isn't there another challenge to that group contained in those figures?

What is the solution?

I'll answer that by asking another one.

How many automobile owners would today be satisfied with a car they had to crank?

That applies to residents of small communities and those living on outlying farms as much as to those in the larger cities.

Yet consider how many there are who still have to crank their telephones.

Now, I believe that residents of the small communities and rural districts are just as anxious to have modern common battery telephone service as they are to

# A NEW PROCESS

## An Improved Dur

STROMBERG-CARLSON Durate telephone instrument cord are now manufactured unde a new process that produces better cord at a lower cost tha has heretofore been possible.

*New Process —*

Production of cords by the new process is so simplified that the outp of a braider operator is many times greater than by the old proce The conductors are arranged in parallel, straight-lay formation. sleeve of the same material as the outside braid of the finished cord placed along with the conductors. In service this sleeve acts as a st cord relieving the conductors of all strain.

*Improved Cord —*

Satisfactory service demands that telephone instrument cords built to give long life and to have low electrical resistance. In additi to these requisites, Stromberg-Carlson Improved Duratex Cords a smooth, flexible, moisture proof, and non-kinking.

Send a trial order for the Improved Stromberg-Carlson Duratex Co and be convinced that "There is nothing finer".

*Pacific Coast Representative*
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San Francisco, Cal.
Los Angeles, Cal.
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**Stromberg-Carlson Telephone Mfg. Co.**

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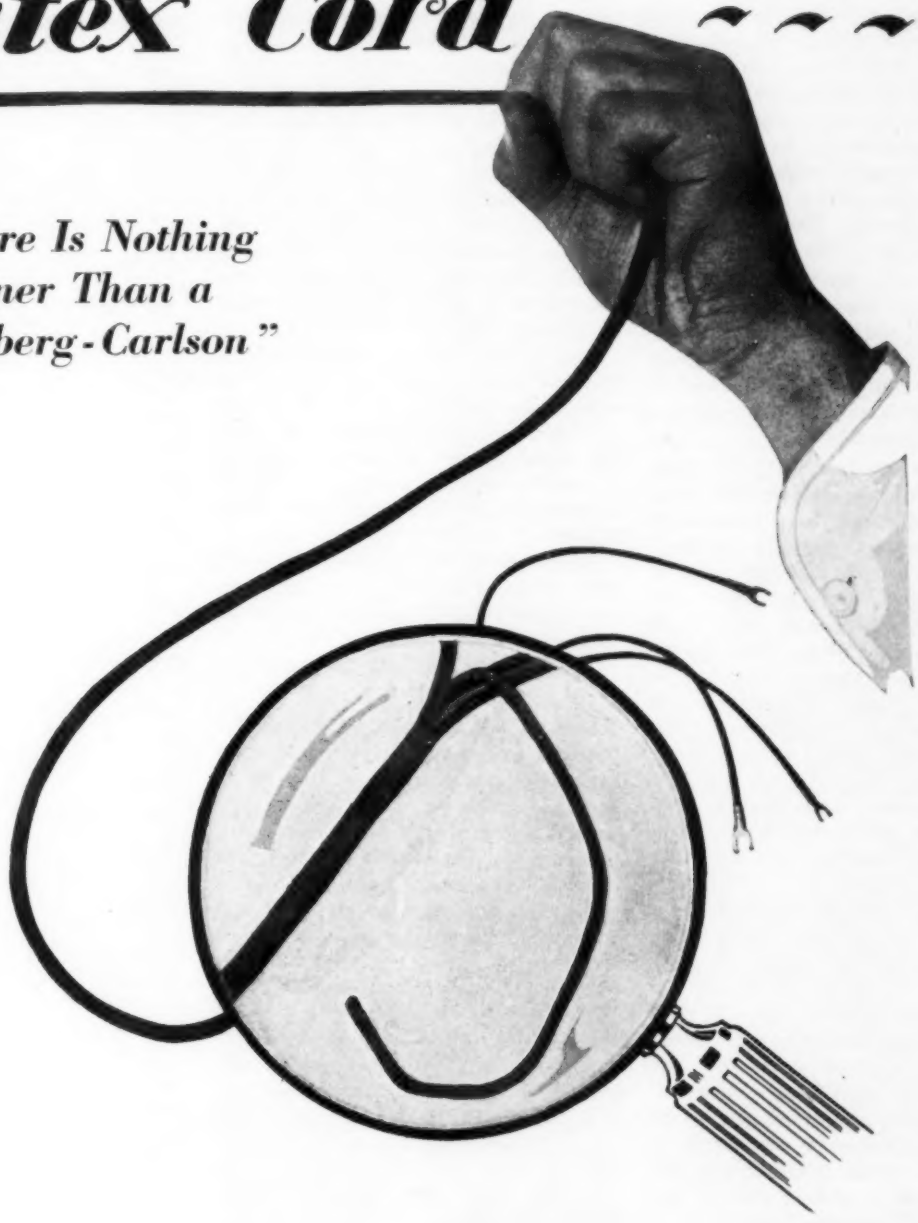
*Branch Offices:*
CHICAGO, ILLINOIS KANSAS CITY, MISSOURI TORONTO, CANADA

*Southern Repr*
Scoville Mer
Company
Atlanta, G

# Stromberg

# Duratex Cord

*"There Is Nothing Finer Than a Stromberg-Carlson"*



# Carlson

Identify your inquiry to advertisers by saying—"As shown in TELEPHONE ENGINEER"

have automobiles, electric lights, and radio sets instead of the horse and buggy, oil lamps, and the old melodeon.

Furthermore, I believe that they are just as willing and as capable of paying the additional price for common battery service over that for magneto service as they are to pay the additional price for the automobile and the other modern conveniences over that for the old-time necessities.

Indeed, these conveniences have become necessities. And I believe that common battery telephone service has become a necessity as compared with a magneto service which gives service sometimes but just as often doesn't. Such a system is an aggravation, not a convenience.

Now, why not apply to the selling of telephone service the same fundamental merchandising principles as were applied to the automobile and other businesses which, as previously stated, have had to sell to meet production rather than simply to meet demand?

I can't help but feel that it is most unfortunate that the idea has been created in the minds of those engaged in the telephone business that it is a natural monopoly. I believe that that idea is largely responsible for fostering this mental and physical inertia of which I speak. As a matter of fact—and I cannot impress this fact too strongly—we in the telephone business are engaged in the keenest kind of competition for the American public's dollar with the automobile salesman, the radio salesman, the electric refrigerator and washing machine salesman, the Fuller brush man, even the power company's salesman who is urging additional convenience outlets.

Why not, first, create a demand and a willingness to pay for this higher grade of service through an educational campaign carried on by means of publicity and advertising; second, improve your inside and outside plant to a point where you are in a position to render this higher grade of service, and third, increase your rates proportionately so as to give a proper return on your increased investment and create a reserve and surplus account out of what is now, if correct accounting methods are used, a deficit.

A friend of mine, a most successful merchant, once propounded to me the following cardinal principles of merchandising which, I believe, have always been pretty generally accepted.

"A buyer's reaction to a purchase," he said, "will be as follows:

First—He will remember whether or not the goods he purchased were satisfactory.

Second—He will remember where he purchased them and his satisfaction or dissatisfaction will, of course, influence his future dealings with that concern.

Third—He may remember what he paid for them but that is not likely."

How to apply these merchandising principles to the particular situation under consideration is the question. Well, there are innumerable magneto plants being operated either at a loss (if they are kept in shape) or in such a way that they are giving only a half-baked service, because the rates, being obtained from them, are not sufficient to keep them properly maintained.

Considerable money must be spent on them to put them in shape from an outside plant standpoint to give even a satisfactory grade of magneto service. Grounded line service can never be a really satisfactory service. Even assuming that grounded lines are converted to metallic, they must not only be properly constructed in the first place but must be properly maintained thereafter.

Yet, if you continue giving only a magneto service, you haven't much in the way of an argument to justify raising the rates to a point sufficient to cover the annual charges against the additional investment required to do this outside plant work and make a fair return on it as well.

Furthermore, you have not cut down your traffic or operating cost one whit, nor placed yourself in a position to do so as your plant grows.

Again, what is the solution which naturally presents itself?

Spend a few thousand dollars more to purchase a common battery central office equipment—raise your rates from 50c to $1.50 per station per month and not only convert a plant that is losing money into a paying one, but convert a complaining clientele into a satisfied one.

I wonder how many of us realize that the bulk of the investment in any given telephone plant is represented by outside plant and substation equipment—between 80% and 90% of it. Just try it some time. Separate the amount of money you have invested in central office equipment from that which is invested in outside plant and substation equipment and see if the percentages I mention are not correct.

I have always preached and, I think, practiced economy and economical operation. I have always felt that, if a plant were operated economically and efficiently, rates and profits would take care of themselves.

But, niggardliness is not economy; miserliness is not thrift; over-cautiousness is not efficiency.

The acid test of the justification for a given contemplated capital expenditure is whether or not such an expenditure will be productive of a greater net return on the total capital investment, either through economies in operation brought about thereby or through a higher gross income chargeable thereto.

The latter of these two results can only be brought about in one, or both, of two ways—an increase in price charged for the commodity and an increase in the number of sales.

There is no questioning the fact that a common battery service is an improvement over a magneto service. The justification for a higher rate schedule is, therefore, inherent therein. I believe that the other method of obtaining higher gross income is also inherent in this change to a better grade of service, viz., an increase in sales or number of subscribers due to the better service rendered.

Please do not think that I am offering any theoretical, slide-rule solution to this problem. The plan of action which I propose has been followed by over seventy small companies formerly operating two or three position magneto switchboards in different parts of the country to my own personal knowledge. They range in size from consolidated properties operating several small units to single isolated plants. They range in location from Texas, New Mexico and Louisiana in the South through Missouri, Kansas, Illinois, Indiana and Iowa in the Midwest to North Dakota, Minnesota and New York State in the North.

Roughly speaking, a common battery plant such as the one I have in mind, as represented by the Junior Multiple type of equipment, will cost a little over twice as much as a magneto board with the same amount of line and associated equipment.

With proper circuit engineering methods applied your rural lines can either be converted immediately to selective rung eight or ten-party common battery lines or put on a convertible line basis to be gradually converted later to this type of service. Let's assume a plant of about 200 lines, 450 stations and two magneto positions.

It is probably costing you at least $1.50 per telephone per year or $675.00 for battery renewals, if you figure this cost (as it properly should be figured), including a man's time, transportation cost, etc.

On a common battery basis, the current required for operating such a system would approximate 1.5 kilowatts for each 24 hours. In other words, the discharge would approximate 31 ampere hours. At 10 cents per kilowatt, which, I think, is high as an average, the power expense would be 15 cents per day or about $55.00 annually, as against your present power expense, properly figured, of $675—an outright saving of $620.00 per year.

Right here, let me bring out the point that the old obstacle to giving a common battery service in a small community seldom exists now-a-days. I refer to the lack of a source of power supply. There

are few, if any, communities today without an electric light and power plant.

The saving on all new common battery instruments, as against new megneto instruments, would average $7.00 each. Assuming growth and replacements at 20 telephones per year, you save another $140 annually on this item.

Right here, let me mention another point that I do not believe many of us realize. If you will take the amount of investment in a common battery central office equipment and divide by the number of stations in service, thus getting a central office equipment cost per station and add the cost of a common battery instrument, the total station cost figure you thus obtain will be no greater than if you do the same thing with a magneto central office equipment and add the cost of a magneto instrument. In other words, the lower cost of your common battery instruments fully offsets the higher cost of your common battery central office equipment.

The saving in traffic costs on the basis of the standard labor value or coefficient of 1.30 for a call on a magneto board as compared with .85 on a small common battery under the "Thank You" repetition method would amount to 35%.

We will not figure this as an immediate saving as it would be hard to translate this theoretical saving into an actual one.

But, even without this, we have a saving of $760 per year, which, on a 20% annual charge basis, would warrant an additional capital expenditure of $3,800.

That is more than the difference between a magneto and a common battery plant of the size under consideration.

In the case of a three-position magneto switchboard to be replaced, there is no question but that the traffic saving can be translated into an actlal one of one position immediately.

This means a saving of between $1,200 and $1,500 per year.

We have, therefore, a plant which costs from $700 to $2,000 less per year to operate.

Such a saving will pay the cost of the new switchboard in from two to four years.

Furthermore, your subscribers will gladly pay 50c to $1.50 more for this type of service as compared with their present "turn-the-crank, maybe-you-get-them-and-maybe-you-don't" telephone.

Let's say you make effective a rate raise averaging $1.00 per month or $12.00 per year per station.

On 450 stations you realize, at this rate, additional revenue to the amount of $5,400 per year.

This is probably the difference between a paying and a non-paying business.

Whether privately owned, syndicate owned, or a mutual company, haven't you a right to this return?

Haven't your subscribers a right to this grade of service?

I believe that you have and that they have, and that it is to your mutual advantage to take this step not only that you may put your business on a profitable basis but that you may take pride in your town and the telephone service you are furnishing it.

What does common battery service offer compared with magneto service?

1. Uniformity of current supply.
2. Elimination of dry cells and cost of replacement.
3. A constant transmission level—most important during this time of extensive toll development.
4. Positive supervision.
5. Uniformity in operating.
6. Reduced operating cost.
7. Simpler and, therefore, reduced cost of maintenance.
8. Lower investment in substation equipment.
9. Better rates.

In a few words, modern, up-to-date service and a profitable business.

All operating companies are realizing that there is no excuse for a magneto board of more than one position.

Are you willing to rouse yourselves sufficiently to go after this just reward for your labors?

Have you got the nerve to go after it?

## GARDNER HEADS TEXAS TELEPHONE ASSOCIATION

Seventeen years ago L. S. Gardner came to Waco, Texas, as general auditor for the Texas Telephone Company. Last month he assumed the duties and title of president of the Texas Independent Telephone Association. Mr. Gardner was elected to this position at a meeting of the directors of the association held at Dallas recently. He is general manager of the Texas Home Telephone Company, with general offices at Waco.

*Lyman S. Gardner, President Texas Independent Telephone Association*

Prior to his advent into Texas Mr. Gardner spent two years with the telephone industry in Charleston, Mo.

Much of the growth and development of the Texas Independent Telephone Association has been attributed to Mr. Gardner. His work has been of a constructive nature, and results gained by his efforts have been both satisfactory and substantial, according to those closely identified with him in his association work.

Although his rise has been steady, Mr. Gardner has reached this position of importance in telephony by following the logical steps of advancement. While general auditor for the Texas Telephone Company he served as membership secretary for several years and assistant secretary for one year, after which he was elected secretary of the Texas Independent Telephone Association. This position he has held for the last ten years.

With the death last April of D. J. Johnson of Santa Anna, treasurer of the association, the offices of secretary and treasurer were merged and Mr. Gardner took over the duties of treasurer as well as secretary.

Mr. Gardner succeeds R. B. Still, Tyler, as president of the association. Mr. Still recently announced his retirement from the telephone industry in Texas in order to become identified with the operating department of the Theodore Gary interests in Kansas City. Mr. Still had been president of the Texas Independent Telephone Association for the last ten years.

Oscar Burton was chosen a director and secretary-treasurer of the association to succeed Mr. Gardner. Mr. Burton is assistant general manager of the Gulf States Telephone Company. Mrs. E. H. Pfeffer of the office staff of Mr. Gardner was elected assistant secretary of the association.

## PHONE PROPERTIES SOLD TO WESTERN CORPORATION

Oklahoma City.—Properties of the United Telephone Corporation have been sold to the Western Telephone Corporation, according to L. W. Scherer, organizer and president of the United Telephone Corporation. The sale became effective July 1. It included exchanges at Watonga, Greenfield, Thomas, Canton, Custer City, Fay, Longdale, Seiling and Eagle City. The Western Telephone Corporation is a Kansas concern with headquarters at Salina, which owns telephone and other utility properties in Oklahoma, Kansas and other states. The United Telephone Corporation was formed a little over two years ago when the Watonga Telephone Company was purchased by Mr. Scherer. Thousands of dollars have been spent by Mr. Scherer in improving the system.

# Stromberg-Carlson Sales Increase

**Last Year's Record, Six Month Average, Exceeded by 30% for the First Six Months of 1930, Despite the Heralded Depression, as Shown by a Statement of Vice President George A. Scoville**

While 1929 was the banner business year in the history of the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., the first six months of 1930 show an increase of 30% over the corresponding period last year, according to a report by George A. Scoville, vice president in charge of sales of the Stromberg-Carlson Telephone Manufacturing Company.

In spite of the Wall street market drop last October and the so-called general business depression which has followed that drop, Stromberg-Carlson is employing more men and women today than at any time in its history, says Mr. Scoville. The company now has 2,000 in its employ. The Rochester concern is continuing its record sales and there has been no let-down in sales expansion, manufacturing or advertising.

These business records are due, in Mr. Scoville's opinion, to Stromberg-Carlson's quality telephone and radio merchandise and its conservative merchandising system.

Stromberg-Carlson has always been a manufacturer of quality products. For 36 years that company has made high grade telephone apparatus and in 1915 began manufacturing quality radio head phone sets and loud speakers.

In 1924, when it made its first radio receiver, telephone methods of manufacture, which required quality products, were applied in the designing and in the making of radio receivers and these methods have made for the success of Stromberg-Carlson receiving sets.

Stromberg-Carlson were the first radio sets built in accordance with the telephone switchboard plan of assembly, which insures utmost rigidity and long life. That company was the first to employ total shielding, which greatly enhances the quality of radio tone. Numerous improvements in Stromberg-Carlson receivers are direct results of the company's long experience in building quality voice transmission and reception apparatus.

According to Mr. Scoville, Stromberg-Carlson operates on the most conservative merchandise program that can be drawn up. Three of the main features of the program are the guarantee not to reduce its prices, the policy of not over producing and the system of selling direct from factory-to-dealer-to-consumer. Speaking of these features Mr. Scoville stated:

*George A. Scoville, Vice-Pres., Stromberg-Carlson Telo. Mfg. Co.*

"Stromberg-Carlson's guarantee to its dealers and consumers 'not to reduce its prices' is one of the keynotes to the success of the company. It was in October that this policy last startled the business world. After the stock market crashed, forcing many companies to announce reductions in the price of their radio receivers, Stromberg-Carlson sent telegrams and letters to all its dealers, reaffirming its price maintenance policy. Later a price increase was made on one model.

"Dumping of distress merchandise on the market by Stromberg-Carlson is eliminated by the company's conservative policy of production. The company has never gone in for 'mushroom expansion,' but instead builds each year only enough additional receivers to take care of the natural demand created by the word-of-mouth advertising resulting from the satisfaction enjoyed by a normally increasing number of Stromberg-Carlson owners. As a result of this policy, the radio market is never flooded by a surplus of Stromberg-Carlson merchandise."

The radio dealer organization of the Stromberg-Carlson Company is one of the most unique systems in business today, Mr. Scoville declared. Commenting on the "direct selling from factory-to-dealer-to-consumer," he said:

"There have been many distinct advantages resulting from Stromberg-Carlson's policy of selling direct to dealers.

"Dealers have enjoyed freedom from the evils of over-crowding, because of the care exercised by the company in its appointment and in the zoning of its territories. The Stromberg-Carlson Franchise has always provided for the fullest possible development of trade areas on the part of retail merchants.

"Under this system, dealers enjoy a closer relationship with the factory, because of the frequency of their contacts with Stromberg-Carlson representatives.

"Stromberg-Carlson officials believe that these policies give the buying public the fullest protection and insure the permanent investment value to the buyer at all times."

The growth of the Stromberg-Carlson Company has been slow but steady, averaging an increase of 20% per year for the past 15 years. The management employs the most conservative business policies but is always alert for taking advantage of new developments in both telephone and radio fields. The company has always tried to prevent speculation in its stock. It is controlled by its employes and their families.

The history of this organization dates back to the beginning of the independent telephone movement in the United States. In the year 1894, just as the original basic telephone patents had expired, two men, Alfred Stromberg and Androv Carlson, formed a partnership in Chicago to build telephone apparatus. Carlson lived in Chicago until his death in 1925, but had not been connected with the company for some time. Both men were natives of Sweden; Stromberg, who also was behind the Stromberg Carburator Company and the Stromberg Clock Company, which have no connection with the telephone company, having come to this country with experience gained in the famous Erickson telephone plants in his native land. After much difficulty, they succeeded in raising $500.00 apiece, which was immediately invested in the new venture, starting a little shop which prospered surprisingly.

One year later the Stromberg-Carlson Telephone Manufacturing Company, an Illinois corporation with the same name as the present company, was formed. Unfortunately, the rosy promises of the first year failed to materialize and, as a result, the organization struggled through

(*Continued on page* 50)

# Californians Emphasize Safety

**The California Independent Telephone Association Invites Telephone Companies to Write for the Illustrations Shown Below, as a Safety Move**

Safety bulletins recently have been issued to all telephone companies requesting them, by the California Independent Telephone Association. These bulletins show, by illustration and diagram, several typical cases in which questions arise as to clearances, materials used, and modes of construction. The bulletin supplies the answers to the questions asked in the pictures, according to the legal requirements set out in the California Railroad Commission, General Order No. 64-A.

The distribution of these bulletins is part of the association work in connection with public and telephone employee safety, and has been made possible through the courtesy of the Southern California Telephone Company.

The following safety rules are given in the bulletin: (See accompanying illustrations).

1. Conductors of open wire shall have a clearance of 12 inches above or below lamp span wires. Cable shall have a clearance of 24 inches above or 12 inches below lamp span wires.

2. Trolley span wires shall have three inches clearance if trolley voltage is 750 or less. If voltage is over 750 the distance should be increased to six inches.

3. Lamp brackets shall have the same clearance as lamp span wires. Cable should be two feet above the lower bracket. The upper brace should be 12 inches above the cable.

4. Although no specific horizontal clearance is required between vertical risers of different ownership, the greatest practicable separation should be secured. Under no circumstance should the hardware of the two risers be in contact.

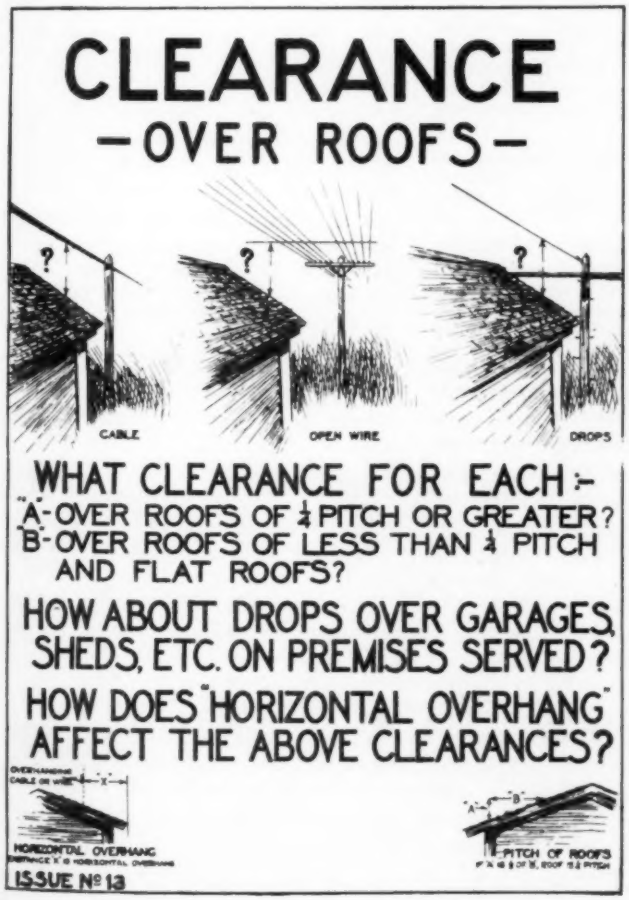
5. The distance from guys to conductors, whether above or below, should be three inches if the voltage of the power line is less than 750, and six inches if the voltage of the power line is between 750 and 7,500.

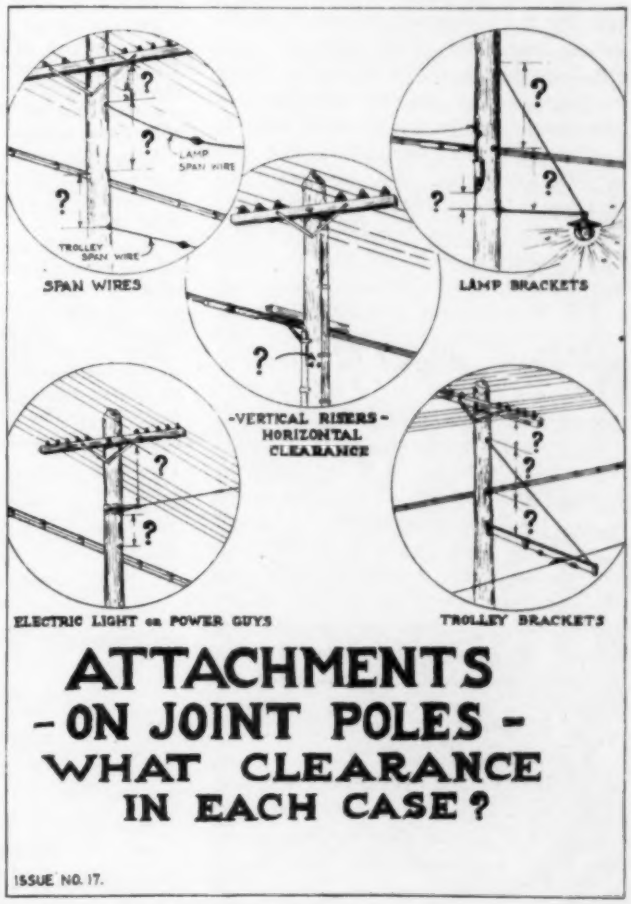
6. Trolley brackets should maintain the same distances required for light and power guys.

7. Cables should maintain a clearance of two feet over roofs of one-quarter pitch or greater, and eight feet over roofs of less than one-quarter pitch. The latter measurement may be reduced to two feet if the horizontal over-hang does not exceed two feet.

8. Open wires and drop wires should maintain a clearance of two feet over roofs of one-quarter pitch or greater, and eight feet over roofs of less than one-quarter pitch. The latter measurements may be reduced to two feet if the horizontal over-hang does not exceed six feet.

**These Bulletins refer to General Order No. 64A of California Railroad Commission.**


CLEARANCE
-OVER ROOFS-
CABLE
OPEN WIRE
DROPS
WHAT CLEARANCE FOR EACH:-
"A"-OVER ROOFS OF ¼ PITCH OR GREATER?
"B"-OVER ROOFS OF LESS THAN ¼ PITCH AND FLAT ROOFS?
HOW ABOUT DROPS OVER GARAGES, SHEDS, ETC. ON PREMISES SERVED?
HOW DOES "HORIZONTAL OVERHANG" AFFECT THE ABOVE CLEARANCES?
HORIZONTAL OVERHANG
PITCH OF ROOFS
ISSUE Nº 13




*Printed and distributed by California Independent Telephone Association.*

# LINE AND DESK

## *PAINT SPRAYS FOR TELEPHONES*

Some time ago mention was made in TELEPHONE ENGINEER of the practice of paint spraying telephones, a lacquer or enamel being applied by means of a pump type spray gun.

The idea was good and the results obtained were favorable, but after due consideration and experience it was found that so much attention had to be given to the actual pumping to obtain pressure that in some instances the job in hand had to be neglected.

To obtain best results it was realized that some other method of application would have to be adopted, that is a spray gun used in conjunction with a motor and air compressor. "Our" pump sprayer quit spraying and began squirting, much to our chagrin after having having publicly announced its practicability. (The fault may have been our own.)

Nevertheless with the idea in mind that the motor-compressor type of sprayer was financially out of reach, we were surprised during a visit to a rather large exchange to find that they were using a small motor-compressor to good advantage. So for forty-two dollars and seventy-five cents we, too, purchased an identical piece of equipment and have been spraying our telephones as they come into the shop for repairs. The work is done neatly at a very low cost.

The thought to be brought out here is this: A telephone never wears out. We have possibly all heard the expression, "That 'box' is worn out." Such is never the case unless firm strokes with an axe have been administered. It is true that cords may become frayed and noisy, or a transmitter may go "high," but as far as the telephone being worn out—never.

With the high standards of telephone engineering being presented today and the ease with which we are able to obtain standard circuits for wiring telephones "booster," and in other desirable manners, why should we not make our instruments appear externally as perfect as we know their circuits to be?

A good application of lacquer or other good type of quick drying paint will last, it has been suggested, approximately ten months and by that time the chances are that the instrument will have to be brought into the shop for overhauling.

It must be remembered that one does not have to be an expert to handle a good paint sprayer and we find that the results certainly justify the small expense and small amount of effort.—Contributed by Ernest Wommack.

## *TELEPHONE LOOKIEGRAPH*

*By Ray Blain.*

The riding of aerial cable for the purpose of making repairs or looking for trouble is considered by many to be a difficult task, perhaps because they don't have the correct type of lineman's chair or cable car and don't go about it in the proper manner. First make sure that the car is in good condition, attach a hand line to it and climb the pole to the messenger. Get set on a pole step or your hooks and pull the car up with the hand line. Set car on messenger and get into it as safely and easily as possible. Like the old-fashioned nightshirt, some go into it head first and others feet first. Get set and shove off from the pole and you are in the air. It is a good idea to leave the end of the hand line attached to the car so that a ground man can pull you back to the pole or, on extra long rides, pull you along the messenger.

I personally prefer the cable car which is equipped with rubber tires on the wheels so they will ride over the rings easier and have no tendency of riding off the messenger, for a lineman should not be required to wear a parachute. These rubber tires are really appreciated when one comes to a splice in the messenger for they roll over it with ease. This type car has recently been equipped with a brake which is easily set and will hold it in place even on a steep grade or a slack messenger. Shields are also placed over the rollers so that it is impossible for a lineman to get his arms pinched, and anyone that has ever had an arm pinched in a cable car will agree that this is a real improvement.

A good car should also be light and well balanced so that it can be easily transferred around poles so that the entire section of cable can be covered without a landing.

## A JOB WELL DONE

**A certain barber is going to retire. This seems to be his story.**

**He has owned a shop for 40 years. During the last 30 years he has run a two-man shop. His hours have been 8 a. m. to 3 p. m. Saturday he closes at noon. He owns his home and an automobile. He has raised two children and is now a grandfather.**

**He has never been in debt. He has never lacked any necessary comfort. He has hundreds of friends, some of them are great-grandfathers. He has cut the hair of their sons, grandsons, and great-grandsons.**

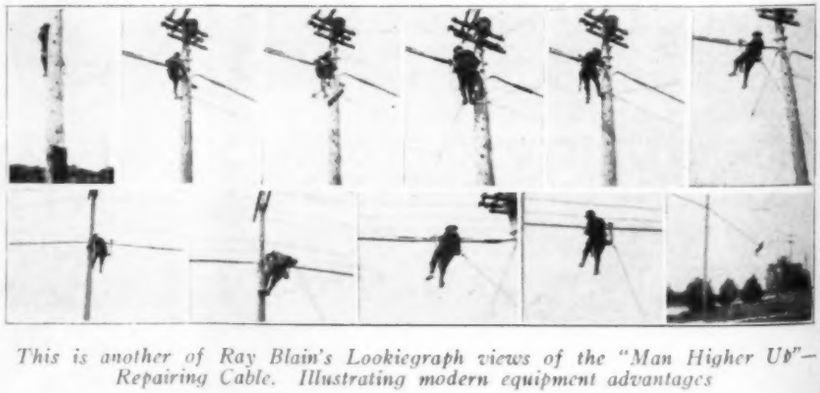
**Everyone likes him. Everyone respects him. He is a skilled workman, an honest citizen, a dependable business man.**

**Most of us want to make a success of our lives, and some of us wonder how it's done. This barber offers a good example. Although he was engaged in a humble calling, he achieved independence, security and comfort by doing his job well. There is no secret in his success, or in any worth while success. —The Copperweld.**

## *ONLY A CABLE CLAMP*

*By The Old Grunt.*

The old "Grunt" notes with pleasure that an improvement has recently been made in the lowly pipe strap or cable



*This is another of Ray Blain's Lookiegraph views of the "Man Higher Up"—Repairing Cable. Illustrating modern equipment advantages*

clamp. This new clamp could be called either for it really combines the advantages of the pipe strap and the cable clamp both, but at the same time eliminates their disadvantages. I feel that this clamp is far ahead of any similar device in general use at this time.

Cable clamps must be of an exact size and fastened to a pole or building very solid if they are to hold a conduit or cable without slipping. A pipe strap works fairly well on conduct, but has many disadvantages when used on lead cable. Also it has always been a trying job to place cable clamps on either cable or conduit and do a good job. This accounts for the crooked vertical runs we so commonly see. The reason for this is that it is no picnic for only a two armed man to hold a cable exactly in place and attach an ordinary cable clamp without it slipping.

With the new variety of clamp which combines the advantages of both the pipe strap and cable clamp they are first attached to the building or pole in the exact line or position desired, and the cable or conduit placed in them later and the belt tightened which holds them in place. The new clamp also holds the cable firmly without any danger of slipping or cuts on the lead sheath. Clamp cuts have in the past cost telephone companies a lot of money.

Yes, it makes the heart of the old Grunt glad to note this improvement of so small an item of material and we believe it will soon become immensely popular and justly reward the far thinking manufacturer for his excellent judgment in bringing out an article which has been needed for so many years.

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*TELEVISION PROCESS TO ELIMINATE BOTH SCANNING DISKS AND MOTORS.*—A system of television based entirely on electrical and physical principles, which is expected by its inventor, Lieut. George Wald, of the Quartermaster Corps, United States Army, at Scott Field, Mo., to eliminate the need for motors and scanning disks in the transmission and reception of images, has just been shown in New York City. The system uses a special scanning disk at the receiving end, inside the glass envelope of which is a series of electrical inductors, which cause the various impulses transmitted over the radio or wire from the sending station to distribute themselves in accordance with their respective frequency, Lieutenant Wald explained. The spots of lights which flicker over the coils of wire within the tube produce the images at any rate desired. The sending equipment operates in the reverse fashion, with a special vacuum tube employing a series of solenium cells. Lieutenant Wald said he makes use of the solenium cells to form a damper, or check, to steady the system and keep the images at the receiving end from wavering. Another feature of the system is that the human voice is transmitted with the image impulses without disturbing the pictures in any way, he said. The system has been named "telephonovision." The entire apparatus is said to avoid entirely one of the great difficulties found in most prior systems of television, that of keeping the receiving sets in exact synchronism with the sender.—Telegraph and Telephone Age.

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## TELEPHONE TIME-GIVING EXTENDS TO WIDER AREA.

All who live within the area served by the New York Telephone Company now find the correct time of day at their disposal at no more cost than it takes to call up the local grocer.

For two years metropolitan dwellers have been able to learn the time merely by taking down the telephone receiver and asking for Meridian 1212. But those who dwell outside the city limits, unless they wished to pay toll rates, have had to depend still upon the town clock, if they could see it, or the factory whistle, if they could hear it, to set their watches by.

They have not been satisfied. In the first place they have lost faith in the scientific accuracy of factory whistles and town clocks. The radio, with its periodical gong-striking and announcement of the exact hour to the second, has introduced a new concept of time-keeping even to those remote regions where train schedules are not a vital, twice-a-day matter and where precise punctuality has counted for little. But the radio does not fill the newly felt need entirely, for it gives the hour when it chooses, not whenever the listener-in requires.

### "Central" as a Time Giver

All of these people, wherever they are, once looked to the telephone operator as the source of exact time information when they had to have it. Then suddenly the erstwhile obliging "central" started refusing their requests, and they learned that the telephone company had stopped giving out the time. Now the company has decided to restore that old informal question-and-answer relationship by supplying time information to all patrons for a fixed charge of 5 cents from flat-rate subscribers and from coin box and public telephone users, and for the equivalent of one local call charge from message rate subscribers.

In 1928, when the New York Telephone Company started to resume time service maintained on a business basis, it went in for time-keeping and time-giving along more scientific lines. In each of the five boroughs of the city is a centralized bureau with special switchboard positions to which are routed all calls for Meridian 1212. Each time-bureau operator has her own little electrical clock from which she gives the correct time to the nearest half-minute. For the extension of this service to the state a number of similar bureaus will be established at points conveniently placed to serve each general locality.

Some idea of the popularity of time service can be gained from the fact that in the first two weeks after Meridian 1212 was created it was called, on an average, some 10,000 times a day. In seven months it was being called approximately 41,000 times a day, and by Jan. 1, 1930, some 52,000 times a day.

### Daylight Saving Changes

Twice a year all New York appears particularly time-minded: when Eastern Standard Time changes to Daylight Saving, and when Daylight Saving turns back to Eastern Stadnard. On the Sunday last year when Standard Time was resumed the number of time calls jumped more than 100 per cent over the normal Sunday traffic. Some 68,000 persons on that September day corrected their clocks.

New Yorkers appear little concerned with the time of day except as their work is concerned. Saturday and Sunday are dull days at the time bureaus, but by Sunday night a sudden spurt of interest comes. There are clocks that have stopped over the week-end and general uncertainty as to whether those still going have lost or gained. Between 10 and 11 p. m. people begin to think about the alarm for Monday morning, and so a peak is created in calls for the time.

Residential subscribers are the largest users of the time service. Outside of Manhattan the busy hour comes from 7 to 8 a. m., when business folk grow anxious over getting to the office on time and mothers are concerned with getting small charges off to school.

In Manhattan the daily busy period at the bureau lasts from 7 until 9 a. m. and is thought to be created equally by offices setting their clocks for the day and by apartment dwellers. Business on the Meridian line picks up again between 11 and 12 o'clock, supposedly in deference to luncheon appointments, and between 4 and 5 o'clock, as commuters begin to think of home-bound trains.

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## MT. MORRIS 'PHONE RATES ARE BOOSTED

Permission has been granted the DeKalb-Ogle Telephone Company to increase rates for telephone service in Mt. Morris, Ill. The new schedule will increase the rates for two-party business service from $33 a year to $36; on individual residence service from $24 to $27; on two-party residence telephone service from $21 to $24, and on four-party residence service from $18 to $21.

# Known Factors Today History Tomorrow

**How Ships See Thru Fogs and at Night. Keep Your Mind Clean. Play Your Regular Game. Another Good Article by W. C. Dillon**

*Looking Forward:* All known factors of today are history tomorrow, tomorrow the world reaches out for the undeveloped marvels that stagger the imagination of man as he realizes the possibility of their fulfillment, for instance:

Scientists believe there is enough atomic power contained in a half glass of water to lift a fleet of battle ships out of the water. The greatest minds of America and Europe agree that atomic energy will be put under control, placing at man's command forces of such magnitude that the present "Juice" being extracted from Niagara Falls will be as a child's play in comparison.

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*The Go-Getters:* Telephone men I am proud to say are in the foreranks of up-to-the-minute experimental developments. Due to my many years of contact with them throughout the country I know they are ever ready to "tangle" with anything of interest from strip poker to a fight. It must be the partial outdoor life we live, combined with the "call-downs" the public give us; anyway daily contact with electrical and mechanical problems in the telephone business puts a man's mind in a receptive mood during his spare time to delve into the latest arts of the hour—television, teletalkies, talking films by television, the noctovisor that "sees" at night through a fog, short wave sets, etc., etc. Much interest is manifested in these things; for instance, recently a friend of mine with his short wave set contacted one Mary O'Brady in Australia. He asked her some usual—flapper—questions, and what she "dot-dashed back" is nobody's business.

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*Play Your Regular Game—Telephony:* It is the most interesting business you can be in, its development will never be completed, its possibilities are unlimited Realize if you will the thrill of satisfaction it must give G. W. Elmen, with the Bell Laboratories, who gave "perminvar" to the world, that magnetic alloy which makes long-distance subsea 'phones practicable for the first time, to know that a cable in which it is used will soon carry conversations across the ocean's floor, under 2,000 miles of sea. And don't overlook the news item of the other day featuring a 15,000 mile telephone conversation, a wonderful accomplishment; to the writer especially, as I can recall connecting up a couple of towns fifteen miles apart with a No. 10 iron grounded toll line, and when completed resulted in the public spirited men of the respective towns collecting in the store where the line was ended in a booth, and putting on a regular party celebrating the event, getting home early in the morning.

But let this percolate into your anatomy—an insurance man who awakens his wife talking insurance, who does not gear-shift it out of his conversation until he turns in for the night, eventually winds up with his mind so deeply groved into a one-way channel that his associates of both sex become overly desirous for the honor of shoveling the first dirt to place him beneath the lilies. So, developing a hobby that is of interest to one's friends as well as himself, is well worth while. Join me for a moment as we take a slant at some of the things that are popping across.

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*Over in England:* September 7, 1927, the Television Society was founded; it now has a world wide membership. They meet monthly in London. A monthly magazine is published by the society; they are very much alive and on the job.

The Jenkins Television Corporation is now demonstrating a complete television receiver for home use. The complete receiver is contained in a cabinet measuring 18 by 18 by 24 inches and the apparent size of the image was 6 by 6 inches. The set is operated by first turning on the neon glow tube by means of a snap switch and then turning on the television signal. A crank on the set is turned to frame the picture properly. The interior mechanism consists of a synchronous motor and the scanning drum. A special distributor serves to flash in succession the four plates contained in the neon lamp. Two transmitters of the company, one at Jersey City, N. J., and the other near Washington, D. C., are on a regular schedule transmitting television programs. Both stations are rated at 5 kw. and operate on 140 meters. At the Chicago Radio Show a device was demonstrated that displayed a 14 x 14 inch picture accompanied by the voice from a loud speaker. A development of Dr. E. F. W. Alexanderson, consulting engineer of the R. C. A.

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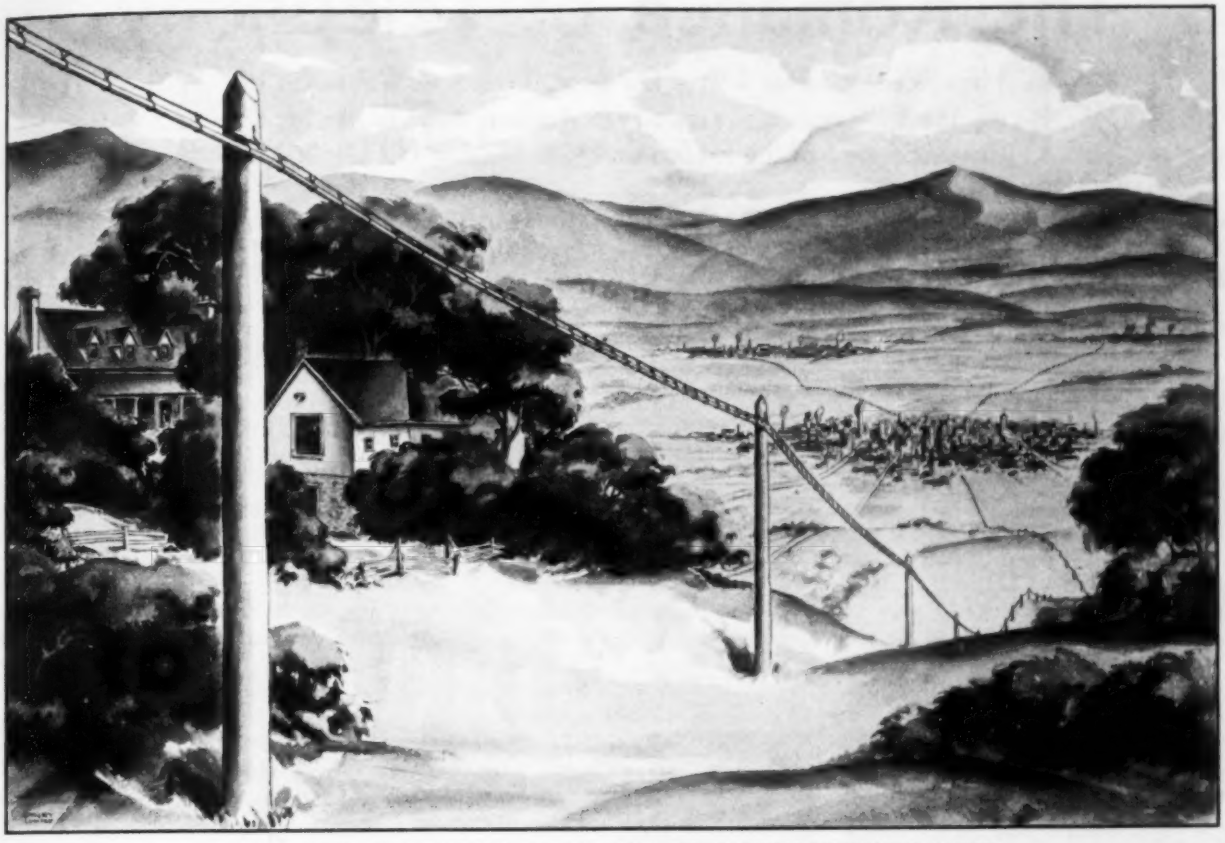
## LAST-MINUTE RUSH FOR TELEPHONE STOCK

Before the expiration of the American Telephone rights to subscribe to additional stock on August 1, American Telephone was under a last-minute rush for extensive accumulation. Telephone has been a persistent downward movement since the new issue was announced last spring. While this decline has coincided with a similar performance in the general market, it has also been in line with the action of a stock for which there is a wide public demand following the issuance of rights. Normally, also, the price of such a stock usually reverses itself as the expiration date approaches. Telephone rights have now been outstanding for a number of weeks. Stock Exchange observers feel that ample opportunity has been given for the distribution of that part of the new stock not wanted by present stockholders. This theory is strengthened by the attractive levels at which American Telephone has been available during this period.

In addition to the relief which the stock will feel from the elimination of rights, American Telephone has a prospect of being one of the outstanding beneficiaries from any business improvement this fall. Company's new installations in the first six months of 1930 were the smallest for many years owing largely to slack business. Toll operations continued to expand, however, and people who have made a study of the situation predict that toll business will increase over the next ten years just about as fast as facilities for handling can be constructed. This outlook suggests new financing will be necessary as frequently over the next decade as it has been since 1920, and that Telephone's return on its regular $9 dividend will be handsomely supplemented by valuable rights from time to time.



AN INTER-CITY CABLE, PART OF THE BELL SYSTEM NETWORK THAT UNIFIES THE NATION

# Vast, to serve the nation . . . personal, to serve you

*An Advertisement of the American Telephone and Telegraph Company*

So THAT YOU may telephone from house to house in a Southern village, from farm to farm in the Middle West, or from the Pacific to the Atlantic Coast—the Bell Telephone System *must* be large. Its work is to give adequate telephone service to one of the world's busiest and most widespread nations. There is 4000 million dollars' worth of telephone plant and equipment in the Bell System, any part of which is subject to your call day or night.

Every resource of this system is directed to the end that you may have quick, clear and convenient telephone service.

In order to meet the telephone needs of the country most effectively, the operation of the Bell System is carried on by 24 Associated Companies, each attuned to the area it serves. Working with these companies is the staff of the American Telephone and Telegraph Company, giving them the benefit of its development of better methods.

The Bell Laboratories and the Western Electric Company utilize the talents of thousands of scientists for constant research and improvement in the material means of telephony. Western Electric, with its great plants and warehouses in every part of the country, contributes its specialized ability for the precise and economical manufacture of equipment of the highest quality for the entire system.

The Bell System is vigorously carrying forward its work of improving the telephone service of the country. It is building for today and tomorrow—for the benefit of every one who lives and works in America.

Identify your inquiry to advertisers by saying—"As shown in TELEPHONE ENGINEER"

# The Romance of Telephony

**Here Is an Address That Is Different. President Walter Gallon of the Wisconsin Telephone Association Tells of the Romantic Side of the Profession He Is Making His Life's Work**

In talking with many of my colleagues during the past two years, a number have said to me, "What is the use! It is about time we should clean up and get out." And, unfortunately, quite a number have done so. I have made it a point to look up some of my friends who are supposed to be enjoying life on their well-earned gains. These fellows had been individual operators for many years and were under the impression that if they did not take advantage of the conditions that existed, due to this awful merger mania that has struck our country, they would be left high and dry. What a folly these thoughts are. These men living on their supposed wealth with nothing to do but try to kill time are living a horrible nightmare. It is absolutely impossible for a man who has been active all his life, unless physically disabled, to live a happy life when all he has to do is to pull coupons and go to the bank to get his money. I am afraid these men who have given up have lost what I believe the greatest charm in life and that is the romance of the game. I defy anyone to show me a business that lends a greater charm to life's endeavor than ours. The telephone is so closely linked with life's success that we who are following this vocation have got a moral duty to our fellow men to carry on.

Some time ago I was led astray somewhat on the thought of departmental specialization but I find as we develop it is physically and mentally impossible for a human being to carry the entire load of telephony in his mind. The ramifications of our business are such, due to the demand that has been put upon us in later years, that we have had to divide our interests in this vocation.

No matter how humble our job may be we are still an integral part in life's endeavor. If we lend ourselves to the romance of the situation instead of being entirely burdened by our problems and allow the problem to be balanced by the romance of the game and figure for a moment what we are doing in the line of human relationship, it lightens the load immensely. You may think me strange when I say that I believe that science has just got a new start in our business. Problems that were some time ago almost insolvable have vanished to nowhere. We see a tendency, and this is growing stronger and stronger every day, to have more of the give-and-take spirit. The man in business whose soul is steeped in greed and getting the other fellow at any cost is gradually being thrown by the wayside.

The tendency for closer and a more sincere co-operation is fast gaining ground. A remarkable instance was that wonderful meeting in Chicago some time ago of the class A companies. Although I was not present I am told that there was never a meeting in telephone industry where a better sincerity of purpose and co-operation was shown. Last year it was my sincere pleasure to listen to a very interesting discussion at the last United States Independent Telephone Association convention on the question of secretarial service. The question involved was the line of demarcation between the telephone duties to the subscriber and the subscriber's responsibility. During the last year the problem seems to have been solved almost by the introduction of science and mechanics. The majority of us have read of the famous work of these scientists on the question of suspended speech and that, coupled with the telotype machines, brings the whole matter of the responsibility of the situation upon the telephone company and takes away the possibility of error on the part of the patron. I mention this in line with my first thought that no matter what problem confronts us somehow or other science and mechanics seem to step into the breach and fill the gap.

I am wondering if the time has not come that more attention should be given to solving the problem of the small exchanges and rural telephone development. We admit there has been a big demand on science in the great metropolitan centers but I cannot help but believe, for the benefit of the human race generally in our country, that we must do something in the very near future to meet the growing need of the rural population. It is a hard problem and, unfortunately, due to the lack of coordination in agricultural communities, pressure has not been brought to bear upon us to solve this problem as we have solved others. Our power neighbors, I am afraid, are getting ahead of us in this connection, and as they expand the solving of the situation, as far as the telephone is concerned, is going to be much more severe due to inductive interference and all the side lights that go with power expansion. We must not forget that the business of agriculture is the biggest business in our country and it ill behooves us to lag behind and not meet this situation.

There is one peculiarity we have to overcome and it is a hard matter. This will mean a process of education. As we all know the average farmer, due to his isolation, makes himself a handy man in all lines of endeavor. Unfortunately, nothing he does is perfect due to his necessity of being a Jack of all trades. Many years ago we thought we had solved the problem when the switched line was brought into play, and today what a horrible mess it is. Our rural friend, used as he is to the cheap service, has brought about a very intense, hard commercial and mechanical problem to solve. The strange part of his side of the situation is this: He cannot understand the necessity of the high cost of maintenance, to say nothing of the tremendous hazards that go with the business due to the development of high tension power circuits and the ravages of nature. I believe this without exception is the most fertile field for the brain of the telephone man today, and this is a matter that will have to be solved in the very near future.

The most peculiar part of our business—and I do not know of any business that is parallel to it—is that we are forced almost entirely to live in the future, and I think it is this very fact that brings about that peculiar feeling of romance that goes with our industry. This continual looking ahead steels us to be on the alert to meet the issues as they come.

No matter what happens, do not for one moment let this wonderful feeling of romance get out of our system.

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The Indiana public service commission recenlty denied the Northern Indiana Telephone Co. their petition for an increase of rates.

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Pinlu Shen, a representative of the Chinese government, is studying the automatic telephone system under the tutelage of the Automatic Electric Company, Inc., of Chicago. He recently was sent to Terre Haute, Ind., to study in the engineering department of the Citizens Independent Telephone Co.

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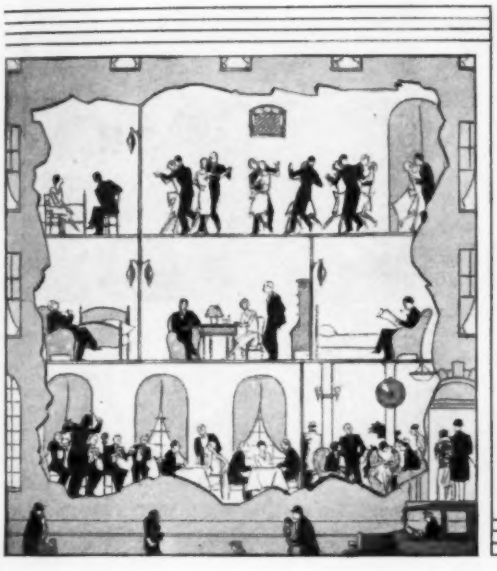
John C. Conway of Aurora, Ill., for 22 years manager for the Illinois Bell Telephone Co. in that district, recently resigned from the company.

# BUILT-IN-MUSIC



## A MODERN IDEA MADE POSSIBLE BY WESTERN ELECTRIC

Many progressive hotels now fill their walls with music—yours to enjoy by simply switching on the loud speaker in your room.

Western Electric Public Address System enables a single orchestra to be heard in every room desired. And the same system—hooked up with a radio receiver or with the Western Electric Music Reproducer — distributes through the building broadcast programs or music from phonograph records.

In large meeting rooms this Public Address equipment makes all seats good. Even though you sit in the last row you hear every word as clearly as though up front. Schools, hospitals, public buildings, amusement parks and airports are using this system to widen the range of hearing.

This equipment, in refinement of workmanship, tonal quality and reliability, reflects the experience gained by Western Electric in 50 years of telephone making.

**Western Electric**

PUBLIC ADDRESS AND MUSIC REPRODUCTION SYSTEMS

*Distributed by* GRAYBAR ELECTRIC *Company*

MANUFACTURERS, PURCHASERS, DISTRIBUTORS FOR THE BELL SYSTEM

# Georgia's Syrup Capital's Modern Phone Plant

**Cairo, Georgia, Telephone Company Transformed Into One of Modern Installation, By H. M. Stewart, Representative, Kellogg Switchboard & Supply Company, Chicago**

That the state of Georgia is well known across our country and abroad there can be no doubt. But how many telephone people think of this and its relation to our business?

Mention Georgia to the sportsman and he allows his thoughts to wander to the happy hunting and fishing grounds of the Atlantic seaboard; the golfer immediately thinks of Bobby Jones and of the expansive course at Augusta. Name the "Cracker" state to a baseball fan and he recalls Ty Cobb and other luminaries of our national sport, while the "rambling wrecks from Georgia Tech" have blazed their colors across the horizon of the football world.

Perhaps you have gazed upon a beautiful piece of Art, chiseled from the cold beauty of Georgia blue marble. No doubt you have listened to the soothing strains of a violin, made possible by resin taken from Georgia pine. Maybe

*A view of the business office of Cairo Telephone Co., Cairo, Ga.*

you have enjoyed the luscious flavor of a Georgia peach or cantaloupe at breakfast, or for dessert at dinner you may have explored the rich, juicy depths of a rattlesnake watermelon. Have you ever thought that within this same state from which we derive the many beautiful and useful things that add to our pleasure and happiness, some of the most progressive units of telephoney have their home?

One of the very interesting telephone systems is that operated by the Cairo Telephone Company, Cairo, Georgia. Cairo is the flourishing center of Grady County, located in the extreme southwestern part of the state. Situated in the heart of the South's most fertile agricultural district, this little city is fast establishing itself in our commercial world. The value of the various crops produced in Grady County during 1929 amounted to approximately four and one-half million dollars.

One of the largest industries of this thriving town is the manufacture and shipping of syrup. Cairo is the largest producing and shipping point of cane syrup in the world, and is the second largest pecan market in the United States. Last year over 50,000,0000 tomato plants were shipped from this center to all parts of the country; over 99% of the collard seed used in this country are shipped from here. Grady County is one of two counties producing Sumatra cigar wrapper and filler tobacco, and Cairo is also one of the ranking bright leaf tobacco markets of the state.

More okra is shipped from here than any point in the United States. During last season over 2,500 boxes of grapefruit and oranges were marketed from one and one-half acres of land in Grady County at a net profit of $3,000.00!

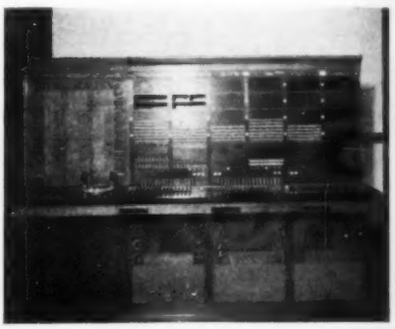
Reviewing these vast industries in their relative values, we can easily understand that Cairo with its present population of 3,167, represents over a sixty-six per cent growth during the past ten years.

It is only fitting that a community with such a progressive spirit should boast a telephone service second to none. Under the very able management of Mr. J. W. Southall, the Cairo Telephone Company well deserves the confidence and support his patrons have accorded him. Neither time nor money has been spared in providing his subscribers with the most advanced ideals of service.

Only the latest and most approved types of telephones are used and these are connected to the central office by an elaborate and complete underground cable plant, laid out and designed to meet any and all conditions. This work and material are comparatively new and were installed under the most up-to-date engineering methods.

No detail was overlooked in planning this central office equipment for the new plant, and as a result Mr. Southall has the most modern apparatus available. In submitting his specifications to the Kellogg Switchboard and Supply Company of Chicago, he requested every feature that would add to, or increase the speed, accuracy and reliability of his service. His wishes were complied with in every respect and today the telephone service of Cairo is equal to that found anywhere and is in keeping with the aggressive spirit of this typical American community.

The Kellogg three-position service



*This picture shows the new 3-position Kellogg Service Switchboard installed for the Cairo Telephone Co. at Cairo, Ga.*

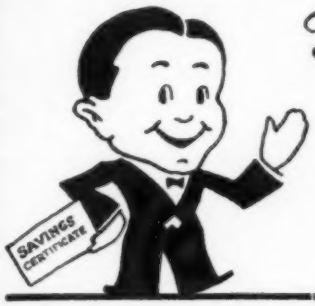
switchboard in operation at Cairo has one position equipped with five toll and twenty rural lines; 3340 lamp signal common battery local lines in the second position and the third is blank for future growth. The Cairo Telephone Company believes that the third position of the switchboard will be fully equipped in the very near future, due to the increasing demand for the new modern telephone service. There are fourteen common battery feature cords and twenty universal cords. The outstanding features of this board are: five frequency machine ringing, keyless listening, automatic peg count and double disconnect.

The high standards set by Mr. Southall apply not only to his equipment but to all other factors contributing to the successful operation of a telephone plant. The latest commercial and traffic methods are used in handling the customer's wants, while close plant routine and supervision insure fast and uninterrupted service. His personnel of employes is of the highest type available and their loyalty and earnest cooperation play a major part in making the Cairo telephone service *par excellent*.



PUBLIC LIABILITY PROPERTY DAMAGE

PUBLIC LIABILITY PROPERTY DAMAGE




*Thrifty Bill Says*

*"Few policies are as good and none are better"*

Most telephone companies insist on Lynton T. Block & Co.'s specialized insurance service because they are

*Careful—Thoughtful—Thrifty*

A POST CARD WILL BRING YOU THE FACTS AND FIGURES

LYNTON T. BLOCK & CO.
ST. LOUIS, MO.
UNDERWRITERS OF SELECTED CLASS INSURANCE
AT A SAVING

511 Locust St. St. Louis, Mo.

*Specialized Insurance for Telephone Co.'s*

WORKMEN'S COMPENSATION AUTOMOBILE

## News From the Field

The Pacific Telephone & Telegraph Co. is building new long distance lines costing $100,000,000. It is expected that the expansion will be completed by 1935. Extending out in all directions from San Francisco, Los Angeles, Seattle and Portland, these additional lines will increase the Pacific coast long distance wire capacity many times.

Philip J. Skolsky of Eau Claire, Wis., district manager of the Wisconsin Telephone Company for the last twenty-five years, has retired from the company. Fred L. Smiley, who has been Racine district commercial manager for seven years, has been appointed to succeed Mr Skolsky.

The increasing popularity of the trans-oceanic telephone service of the American Telephone & Telegraph Company has resulted in an application made by that company to the federal radio commission for a channel for another circuit. It is reported that at one time during the stock market slump the company had 100 trans-oceanic calls, of which it could accommodate only twenty-nine.

The Municipal Telephone & Utilities Co. has contracted to take over the Kentucky States Telephone Co. within a short time. The Kentucky States Telephone Co. is at present part of the Commonwealth Engineering & Management Corporation. Several other utility properties in Kentucky will be transferred at the same time.

Stockholders of the Shanghai Mutual Telephone Co., Shanghai, China, have voted to accept the offer of International Telephone & Telegraph Co. to purchase their company. The Shanghai company operates in both the international and French settlements of the city and on May 31 was serving 36,219 telephones.

Twenty-five foreign countries are now connected by telephone with the Bell system in the United States. Connections are made by means of land lines, submarine cables and radio telephony.

The Bell system added approximately 165,000 telephones during the half year recently ended, according to the report of the president of the company. The report showed net earnings for the first six months of this year of $98,600,000 as compared to $92,046,000 for the same period of 1929.

The Gulf States Telephone Co. plans several improvements in its equipment at Kosse, Texas, according to the report of John W. Miller, vice-president, and Oscar Burton, general manager, who have completed a survey of the company's property in Kosse.

Dial telephone central office equipment costing $232,000 is being installed in the Niagara central office, Detroit, Mich. The Niagara office, one of four new central offices opened in Detroit by the Michigan Bell company in the last eight months, now serves 6,136 telephones instead of the 2,735 with which the office was opened.

Objecting to increased rates proposed by the Rushville Cooperative Telephone Co., citizens of Rushville, Ind., have carried their plea in a petition to the Indiana Public Service Commission.

Expenditures of $11,637,280 have been authorized by directors of the New York Telephone Co. Total appropriations since Jan. 1, 1930, have amounted to $61,858,095 of which $51,620,245 has been expended for service in the metropolitan district.

The Springfield Telephone Co., Springfield, S. D., is utilizing the summer months by installing underground cable service and getting lines in shape.

American Telephone & Telegraph earnings for the first six months were $5.71 a share on 14,309,035 common shares, as against $6.15 a share on 13,028,807 shares in the first half of 1929.

The Johnson County Telephone Co. cited extensive improvements in equipment at Marietta, Ind., as evidence of a need for increased rates in a recent hearing before the Indiana Public Service Commission. The Johnson County Telephone Co. owns and operates all exchanges in Johnson county and it is business men in towns other than Marietta who have objected to the increase.

The Dakota Central company has a crew of 20 men replacing poles and improving telephone lines near Geddes, S. D.

Another Indiana city, Terre Haute, objects to increased rates. The city seeks to set aside an order of the Indiana Public Service Commission granting the Citizens Telephone Co. the right to raise telephone rentals in Terre Haute and Vigo county.

The Central West Public Service Co. has asked permission to increase rates in Madison, Minn., and in return promises that city a modern common battery telephone system and also to rebuild rural lines.

Recently more than 18,000 telephone makers at the Western Electric Hawthorne works, Cicero, Ill., following the distribution of a $1,700,000 vacation payroll, left for a two weeks' holiday. This is the first time an industry has gone on vacation in such a wholesale scale and exceeds last year's experiment by 5,000. An emergency force was kept to work during the general vacation period.

Improveemnts and expansions costing about $9,000,000 are part of a $17,000,000 operating budget of the Bell Telephone Co. of Pennsylvania for the Pittsburgh district this year.

Plans are under consideration for extension of commercial radio-telephone service from the United States to Australia, the Philippines and the Orient, according to Walter S. Gifford, president of A. T. & T.

Rehabilitation work by the Home Telephone & Telegraph Co. includes placing telephone poles in Fort Wayne, Ind., and the Albion and Ligonier toll lead, from Kendallville, Ind., to Ligonier, Ind.

The 250-mile trench between Kansas City and St. Louis for a $7,000,000 underground cable has been completed. Official ceremonies were held exactly one year from the day on which work on the trench was begun.

A man who has recently completed 52 years of service with one telephone company is William Nightingale of Utica, N. Y. Fifty-two years ago he began as messenger boy in the Utica office of the New York Telephone company. Now he is in the plant department.

The Middle States Utilities Co. is preparing to build a new telephone building in Princeton, Iowa.

The new Chicago telephone franchise ordinance has been approved by a committee of the city council by a vote of 11 to 5. The ordinance provides for a 23 year ordinance for the Illinois Bell Telephone Co., which can be terminated at any time by either the city or the company on a six months' notice. The city is to receive three per cent of the gross receipts.

Directors of the Michigan Bell Telephone Co. have authorized the expenditure of $1,315,000 for new construction. Of this total $635,000 is for the Detroit exchange and $680,000 is for the balance of the state.

# Crapo
GALVANIZED PRODUCTS

**Telephone and Telegraph Wire**
- Extra Best Best (EBB)
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**Seven Wire Steel Strand**
- Standard
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- High Strength
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*Crapo* Galvanized Products combine *every* element essential to long life and low maintenance cost: pure zinc coatings, *non-cracking, non-peeling*—correct tensile values—proper ductility.

Immediate shipping service from Distributors' stocks in all jobbing centers.

Manufactured Exclusively by
*Indiana Steel & Wire Co.*
*Muncie, Indiana*

# ELIMINATE SOLDERING WASTE

Separate fluxes waste 50% of your soldering time, labor and materials. Eliminate waste caused by oxidized connections and loosened contacts. Use Kester Flux-Core Solder. Its simple, sure operation will cut your costs in half, at the same time doubling your efficiency.

Whatever your particular soldering needs there is a specific Kester Solder to meet them. Kester Acid-Core for heavy duty—Kester Rosin Core for delicate work. Consult the Kester Research Department for aid in selecting the right solder for your purpose. This imposes no obligation.

*From all Jobbers*

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**4218 Wrightwood Ave. Chicago**
**Incorporated 1899**

Made From Ohio River Fire Clay
Ohio River Fire Clay has long been recognized as superior for products where strength, and long life are required.
VITRICLAY conduits are the only duct made from this famous clay.
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PRODUCTS
1. Smooth duct
2. Uniformly glazed
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4. Finished with exactness and
"Straight as an arrow"
THE KAUL CLAY MANUFACTURING CO.
TORONTO, OHIO.

## CROSSTALK THEORY

(*Continued from page* 18)

tone is required as it is the present practice to use a tone rather than the voice for the source of energy in the disturbing circuit.

Figure 3 illustrates the schematic diagram of a crosstalk set arranged for measuring crosstalk.

In operation the switch is thrown so as to send the testing tone out on the disturbing line where due to the crosstalking effect of the two lines it is picked up by the disturbed circuit and comes back to the tester's ear phones. He notes the volume of the tone picked up in this manner, and then throws the switch so that the tone is fed to the head set through the variable resistance shunt. This shunt is then adjusted until the same tone is received via the shunt, as is picked up due to the crosstalking tendency of the two circuits. The procedure usually consists in throwing the switch rapidly back and forth while adjusting the shunt to give the proper volume.

When the volume received each way is the same then the number of crosstalk units is read directly from a calibrated scale on the variable resistance shunt. The crosstalk set in effect measures the current fed into the disturbing circuit as compared to the current picked up in the disturbed circuit.

Crosstalk can be measured with the arrangement described and using the voice instead of a tone; however, this method is much slower and is seldom used.

## A. T. & T. ISSUES LARGEST AMOUNT OF CAPITAL STOCK IN HISTORY

New York.—With the expiration of the current rights to buy additional shares it is expected that assets of the American Telephone & Telegraph Company will, for the first time in its history, total over $3,000,000,000. This estimate is based on the premise that upwards of 80 per cent of the stockholders elect to pay outright for their additional stock. In 1928 and in 1926, when American Telephone & Telegraph stockholders exercised rights to buy additional shares 83.8 per cent of the new stock was paid for outright.

On June 30 total assets of the American Telephone & Telegraph Company approximated $2,845,000,000. The new stock offering amounts to $257,940,700. Stockholders are to get the new stock at $100 a share on a one for six basis. It is therefore figured that if upwards of 80 per cent of the shareholders take their new stock under the single payment plan upwards of $215,000,000 will be added to the company's assets as of August 1.

Another feature of the present stock offering is that it is the largest capital stock issue in the history of the company.

## WALTER J. UHL ON PACIFIC COAST

A letter from Walter J. Uhl, general manager of the Logansport Home Telephone Company, Logansport, Indiana, states that he has arrived in California from a trip in Alaska which he enjoyed very much. He will spend some time on the Pacific Coast before returning to his home. May 1st Walter secured a six months' leave of absence and with Mrs. Uhl is taking that long delayed and much needed vacation.

## GAIN IN 'PHONE BUSINESS SEEN

Measureable advances in business volume, although at a rate substantially below last year, are in prospect for telephone companies during 1930, according to the Standard Statistics Company.

"Gross receipts thus far have been consistently ahead of last year, according to government figures which are corroborated by reports of individual companies, although net income in general has been below that of the corresponding intervals of 1929," the company says. "Careful investigation of the reasons underlying this anomalous manifestation reveals as the cause a conservative accounting basis which is, in reality, no threat to the continuity of dividend payments."

"These and other features of the present-day situation of the telephone and telegraph companies reveal logical reasons for expectation of further growth of profits as well, once the maladies of 1930 have been dispelled."

## IMPROVEMENTS FOR OCONOMOWOC

The Wisconsin Telephone Company recently started installation of additional long distance central office equipment in the Oconomowoc, Wis., office. The work, which will entail an expenditure of $5,000, will be completed by September, according to Allan K. White, manager of the company.

The constantly increasing use of telephone service in Oconomowoc is evidenced by the fact that operators daily complete an average of 8,900 local calls and 245 long distance calls for the 1,828 telephone subscribers.

## RADIO-TELEPHONE TO CHINA

Recent publication of advices from China that the Radio Corporation of America was planning to inaugurate radio-telephone service to that country has not been commented on extensively by officials of the Radio Corporation. One official indicated that such service might be commenced, but that he had no knowledge of it at present. Reports from China indicate that the service may be established through the sending and receiving stations of the Radio Corporation near Bolinas, Calif., Koko Head, Hawaii, and Shanghai.

## FLEMINGTON HAS NEW QUARTERS

The New Jersey Telephone Company has moved its headquarters to the building purchased in Flemington several months ago. The installation of the latest type of equipment and arranging for the lead wires to the new station required several weeks of work.

One of the rooms on the first floor is used for the terminal equipment. The operating room on the second floor is equipped with a four-place switchboard which triples the capacity of the former facilities and will care adequately for the growth of the business. The company is planning additional circuits to Trenton and High Bridge. The present staff of six operators will continue to handle the business. The company handles all the long distance service out of Flemington, being linked with the New Jersey Bell Company lines.

## U. S. HAS 59 PER CENT OF WORLD'S TELEPHONES

Latest telephone census shows a total of 32,712,284 telephones in the entire world on January 1, 1929. Of these, 19,341,295, or 59 per cent, were in the United States. On the same date Europe had 9,236,685 telephones, or less than one-half the number in the United States, and 28 per cent of the world total. The remaining 13 per cent was distributed throughout the rest of the world.

The United States also is foremost in the number of telephones in proportion to population with 16.3 telephones for each 100 persons. This is nearly ten times as many telephones per 100 population as there are in Europe or the world as a whole. The only country with a telephone density approaching that of the United States is Canada with 13.7 telephones per 100 population.

Small towns and rural districts in the United States are exceptionally well provided with telephones. In this country communities with less than 50,000 population average 12.6 telephones per 100. This is greater than the total telephone density of any other country except Canada and exceeds the telephone facilities of most European cities.

**RUNZEL-LENZ ELEC. MFG. CO.**
**ESTABLISHED 1904** **CHICAGO**

**Specializing in Manufacture of**

# CORDS

**FOR ALL CLASSES OF TELEPHONE WORK**

**SIERRE EQUIPMENT CORPORATION**
**Los Angeles—San Francisco—Seattle—Pacific Coast Distributors**

"Cope"

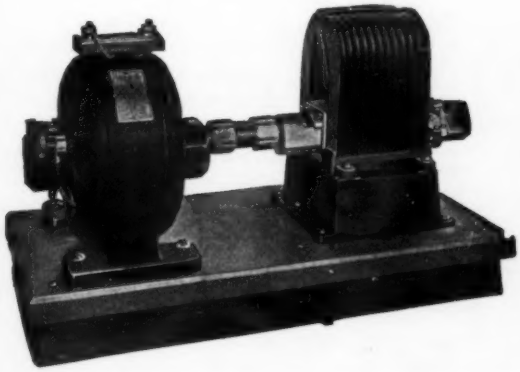
Flexible Metal Tubing with Bell Shaped Ferrule and Brass Nozzle which slips into the Duct.

## Pull-in Guides for Lead Sheathed Cables

**T. J. COPE, Inc.**
Manufacturers of
Complete Equipment for Cable Installation
6122 Vine Street, Philadelphia, Pa. 19 So. La Salle Street, Chicago, Ill.

## HOLTZER-CABOT

Magneto - Ringing - Motor - Generators
*Maintain Better Service*



Maintaining an efficient, economical, carefree ringing service need not be a problem—but it does require good judgment in selecting your equipment.

Install Holtzer-Cabot Magneto Ringing Motor Generators. These units will enable you to dispense with battery maintenance and constant service diligence. Can be supplied for any voltage or special current.

We invite correspondence. Complete data on request.

**HOLTZER-CABOT ELECTRIC CO.**
125 Amory Street, Boston, Mass.
6161 So. State Street, Chicago, Ill.

## TELERING

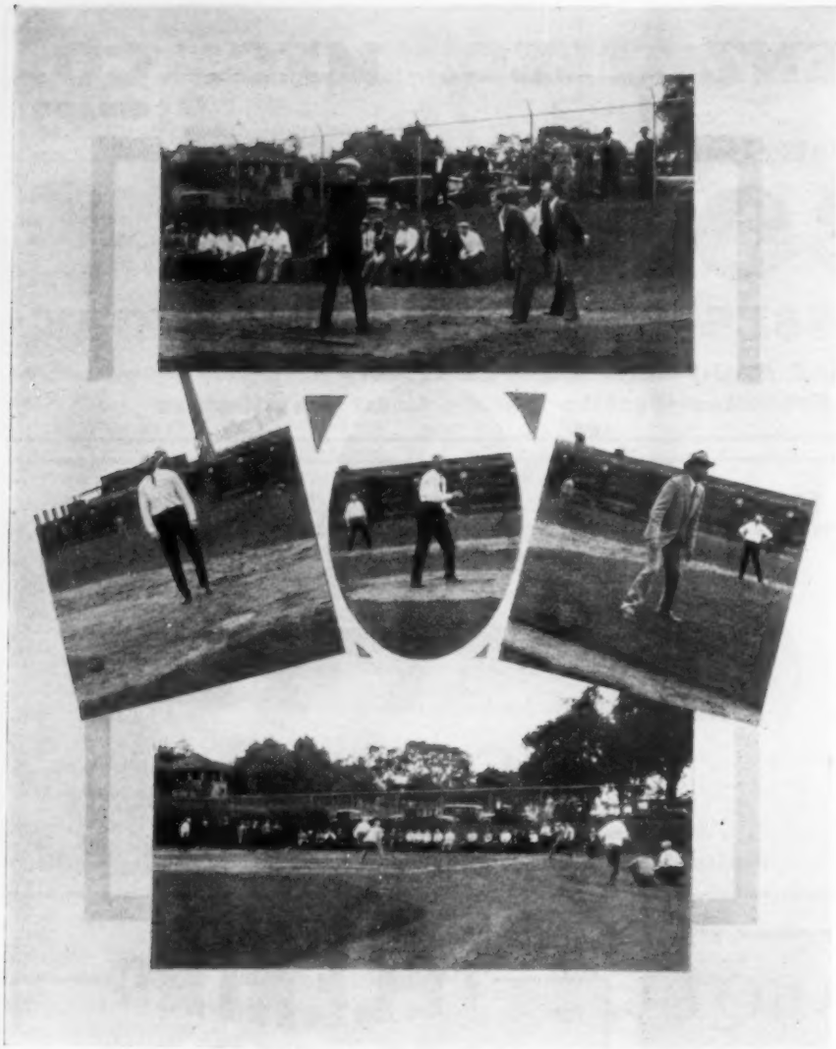
For Central Office and PBX Ringing
**IN USE ALL OVER THE WORLD**

ONE REED!
ONE CONTACT!
IDEAL WAVE FORM

REDUCE YOUR RINGING COST
ORDER ONE ON TRIAL

More power than you need
IT PAYS FOR ITSELF
Converts 60 Cycle Lighting Current to 20 Cycle Ringing Current.
POSITIVELY NO RADIO INTERFERENCE
Very low current consumption
Price $44.00—F. O. B. Elyria
Fully Guaranteed
Sold by Leading Telephone Distributors

**Telkor, Inc., Elyria, Ohio**
(Write for booklet)



*The Stromberg-Carlson Indoor Baseball League cannot be opened unless the "old-timers" show the youngsters how the game is played. The league recently opened and the "old-timers" once more took their positions for an inning and gave the league a good send-off.*

*The accompanying picture shows plenty of action. At the top, Ralph Gardiner, a foreman in the Telephone Department, is at bat with Sidney Beyland, General Superintendent, doing the catching, and Charles Fitzmorris, of the Employees' Relations Department, umpiring.*

*In the center, left to right, Wesley Angle, Vice-President and Secretary, is seen guarding the initial sack; W. Roy McCanne, President and General Manager, is pitching a hot one across the plate, and E. A. Hanover, Vice-President in charge of production, covering the territory around third base. Frank C. King, Manager of the Scoville Mercantile Company, Stromberg-Carlson representatives in Atlanta, Ga., is seen playing second base.*

*Below, Frank Carr, Manager of the Cost Department, is missing one of Mr. McCanne's out curves.*

## NORTHERN INDIANA ASSOCIATION HOLDS SUMMER MEETING

John Troyer of Elkhart, Ind., was elected president of the Northern Indiana Telephone Association at the summer meeting held recently at South Shore Inn, Lake Wawasee, Syracuse, Ind.

Other officers chosen for the ensuing year were: Roscoe D. Pontius, Rochester, vice-president; Theodore Stoops, Nappanee, secretary-treasurer, and Charles R. Hermence, Elkhart, and J. W. Scott, Warsaw, directors.

More than two hundred delegates attended the convention, at which separate sessions were held for managers, plantmen, and traffic people. Frank A. Baker, assistant general plant superintendent of the Home Telephone & Telegraph company of Fort Wayne, addressed the managers' meeting on "Routine Maintenance for the Small Exchange," in which he advocated a fixed schedule for various classes of routine work.

The traffic meeting was addressed by V. L. Flora, Indiana Bell district traffic superintendent, who spoke on "The Needs of Our District," and Miss Ethel Anglin of Leesburg, who read an amusing paper entitled, "Reminiscences of a Night Operator."

C. N. Smith, Indiana Bell district traffic superintendent, addressed a general meeting of all delegates, speaking on "Reasons for Established Routines."

The banquet, which was the principal social event on the three-day program, was addressed by Major Norman Imrie of Culver Military Academy.

# Book Review

*Electricity for Beginners*, an elementary work on electricity written in non-technical language by Edward Harper Thomas, published by Norman W. Henley Publishing Co., 2 West 45th St., New York. 172 pages, illustrated. Price $1.50.

This volume has been prepared for those persons who may be interested in the study of electricity and yet have no technical background or knowledge of this subject. It is exactly what the title claims for it, "Electricity for Beginners." It assumes no previous study on the part of reader or student, but starts him at the very beginning of the subject of electricity.

The idea for this work originated some years ago in a request from public schools for something simple enough to be used in manual training classes. The author conceived the idea of forty elementary lessons in electricity. These he prepared in a pamphlet form. They proved popular and subsequently he enlarged them and compiled them into the form in which they now appear.

## FAIRFAX CITIZENS REFUSE IMPROVED SERVICE

At an election here July 8 a proposed franchise to the Oklahoma Telephone Company, Fairfax, Okla., already serving the community, was defeated. The proposal was that the company be authorized to replace the present plant with modern automatic equipment. As the change would have involved a substantial increase in rates, the proposition was not favored by a majority of the citizens in the face of existing local and general business conditions.

## POTEAU CITIZENS APPROVE COMPETITIVE PHONE FRANCHISE

Citizens of Poteau on July 21 granted a telephone franchise to the LeFlore County Telephone Company, organized by L. E. Carmichael and associates. The vote was 571 for and 111 against the franchise. The Oklahoma-Arkansas Telephone Company now operates an exchange at Poteau.

## "BLACK BEAUTY" POLES

Cost less per mile, per year, than untreated poles of any species.

*American Electric Company, Inc.*

Distributors of "Black Beauty" Poles and Cross Arms to the Independent Telephone Trade

State and 64th Streets : : Chicago, Ill.

Branch Office and Warehouse: 622 Wyandotte St., Kansas City, Mo.

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3¢O The International Dating Nail

***International Poles in service 30 years and still strong prove the economy of International Methods***

This dating nail in poles is your protection against inferior timber and treatments.

**International Creosoting & Construction Co.**

General Offices—Galveston, Texas

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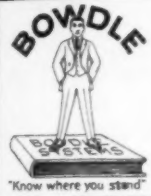
BOWDLE



"Know where you stand"

**Investigate Our Centralized Accounting Plan**

This monthly Audit will save you lots of money and give you important information that you should have about your business—the best of all business, if properly managed.

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To Reach the Man Who Does the Buying Advertise

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## Get EVER-PROTECT aid in your construction.

EVER-PROTECT has proved practical and profitable in making many hundreds of cable installations underground without a conduit. It protects cable against storm damage, corrosion, chemical action, electrolysis and abrasion.

In liquid form EVER-PROTECT is great for overhead work, protecting your cable and messengers against chemical action and other destructive influences.

Ask your nearest jobber for complete details.

**National Cable Compound Co.**

Incorporated

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## THE NEW STEWART TEST SET

**Tells distance and direction to trouble without opening the line. Equipped with Detector Coil, which is connected to receiver by plug and jack.**

**Test Set comes complete with all cords and clips, battery, etc., ready for use. Has Head-band for Receiver.**

**Sent on ten days' trial.**

**Also Cable Testers, Test Cabinets, Detecto-Meters and Pocket-phone.**

**STEWART BROTHERS**

OTTAWA - - - - - ILLINOIS

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## Dependable NORTHERN WHITE CEDAR POLES

that offer *utmost* in Quality and Value.

*Guaranteed* Butt Treatments

## MICHIGAN POLE & TIE CO.

NORTHERN AND WESTERN POLES

NEWBERRY, MICHIGAN

Reed City, Mich. YARDS St. Paul, Minn.

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HOTEL *Famous for food*

CLARK ST. NEAR JACKSON BLVD.

# ATLANTIC

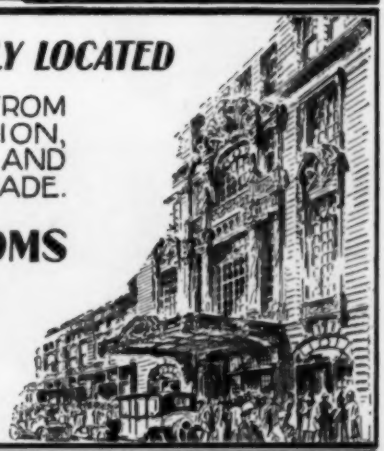
***MOST CENTRALLY LOCATED***

ONE BLOCK FROM LASALLE STATION, POST OFFICE, AND BOARD OF TRADE.

**450 ROOMS**

**$2.00 UP**

*WRITE FOR FOLDER*



# CHICAGO

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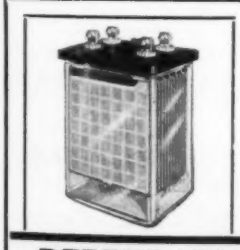

**For Every Job**

Dependable battery operation is imperative to uninterrupted telephone service.

Exides are dependable. Thirty-five years of service in the telephone industry have proven that. Dependable Exides assure a long life of satisfactory service.

**DEPENDABLE EXIDE BATTERIES**

Exide BATTERIES

**The Electric Storage Battery Company**

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# With Manufacturers and Jobbers

## TELEPHONE RINGING MACHINE DESCRIBED IN PAMPHLET

A new pamphlet, described as Telering, the frequency changer which may be used as a ringing machine for both central office and private exchange ringing purposes, has recently been mailed out by Telkor, Inc., Elyria, Ohio, manufacturers of Telering.

Telering operates as an impulse selector, in that it selects certain of the input impulses, resulting in an output consisting of true sine waves, but at a reduced frequency.

Because of this mechanism there are supposed to be no destructive high voltage peaks in this wave form.

To obtain this result, it is claimed that only one contact is necessary, and as it makes and breaks at zero potential, there can be no arcing and consequently no depreciation due to that cause.

Telering derives its power from commercial lighting mains, supplying either 110 or 220 volts, 60 cycles or 50 cycles. The output ringing current is 20 cycles if the input is 60, or 16⅔ if the input is 50. Each Telering machine must be regulated to the voltage and frequency of the input current.

## STROMBERG REPRESENTATIVES VISIT INDIANA EXCHANGES

Paul D. Myers, C. A. Foster and H. V. Woleben, members of Paul D. Myers, Inc., Stromberg-Carlson representatives in Indiana, recently made a trip through Southern Indiana for the purpose of visiting exchanges equipped with Stromberg-Carlson switchboards.

According to Mr. Myers, the journey was very interesting as it took them into

*Paul D. Myers, C. A. Foster and H. V. Woleben, Stromberg-Carlson Representative*

settlements where they had never been.

The men visited various models of Stromberg-Carlson switchboards, some of which have been in use for many years. Mr. Myers says that although no special attention had been given the boards, they had stood up day after day and year after year without giving any trouble, except that due to normal wear and tear caused by constant switchboards traffic.

On this trip the men met with the directors and stockholders of the Friendship Mutual Telephone Company and secured an order for one complete No. 105-A switchboard and central office protector equipment.

Paul D. Myers, Inc., was formed recently with headquarters at 333 North Pennsylvania Street, Indianapolis.

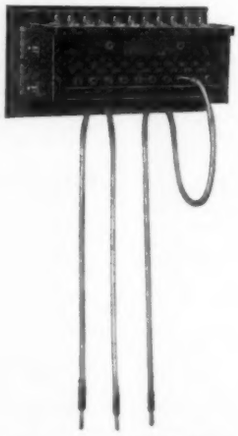
Mr. Myers has been in the employ of the Stromberg-Carlson Company for 30 years, for 26 years being Illinois sales representative, and four years manager of the Chicago radio department of that company.

Mr. Foster has been with the Stromberg-Carlson Company for 15 years and recently he had charge of the installation of a radio program system in the 2,500-room New Yorker Hotel.

Mr. Woleben was former naval electrical instructor and was connected with the Westinghouse Supply Company of Indiana before joining Stromberg-Carlson.

## NEW KELLOGG SWITCHBOARDS FOR TEXAS COMPANY

That the Texas South-Eastern Railroad Company's business must be good is somewhat indicated in the fact that



*This picture shows the Kellogg No. 9-B Magneto Wall Type Switchboard, two of which were installed by the Texas South-Eastern Railroad Company*

they have recently placed an order with the Kellogg Switchboard & Supply Company, of Chicago, for two No. 9-B magneto wall type switchboards.

This type of switchboard can be operated with any standard magneto telephone and consists of a compact cabinet, wired and equipped with ten-line circuits of the combined drop and jack type.

The line wiring terminates in binding posts on top of the cabinet, to which may be fastened the outside lines.

Two complete connecting circuits are equipped with four cords and plugs and two supervisory or listening-in jacks.

Two complete connections can be made at one time, and the operator can listen in on either without breaking the connection.

This little switchboard, as shown in the illustration, is a favorite among railway as well as gas, electric, power and other companies operating a limited number of long lines to connect for intercommunicating purposes.

As a special feature that can be added to this Kellogg magneto switchboard is the code night alarm. The drops can be equipped with code night alarm contacts, which arrangement causes the night alarm bell to give a signal to correspond with the code rings on the line.

## MOTOR-DRIVEN POLE CHANGER

The Bodine Electric Company, 2254 West Ohio Street, Chicago, manufacturers of fractional horsepower A. C. and D. C. motors and generators, have recently developed a new motor-driven contact maker for converting direct current to alternating current by reversing the direct current through a special commutator. Direct current is fed to the commutator through a pair of slip rings and the output is taken from brushes in contact with the commutator.

The motor can be wound for any alternating or direct current voltage and has no electrical connection with the slip rings or commutator. For therapeutic work, the commutator is designed to give an alternating current of 360 cycles per second or higher if necessary. The same equipment can be used for selective frequency ringing or for any purpose requiring an alternating current. These units are made in capacities of 100 watts or higher.

## INSTALLS STROMBERG-CARLSON MAGNETO SWITCHBOARD

The Morning Sun Telephone Company of Morning Sun, Ohio, recently cut into service a new No. 105-B Stromberg-Carlson Magneto Switchboard. This company has owned a Stromberg-Carlson magneto board for the past 18 years and according to the officials of the company the board and equipment has given the utmost satisfaction and service.

**AMERICAN CROSSARM & CONDUIT CO.**
14 Mills — Main Office—Chicago, Ill. — 73 Warehouses
Manufacturers and Distributors
CROSSARMS — FIR — Creosoted — Yellow Pine
Creosoted Wood Conduit
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*Super-Service on rush orders!*

If you are in a hurry your order can be loaded and on the way the same day we receive it. Quality poles since 1882 assures you of guaranteed stock and satisfactory dealings. Let us quote you prices.

Northern and Western Cedar
With or without butt treatment

NAUGLE POLE & TIE COMPANY
59 East Madison Street, Chicago
Branches: New York, Columbus, Kansas City, Spokane, Los Angeles, Boston, Madison.
Main Yards and Butt-treatment Plants: Minneapolis, Pinconning, Michigan, Spokane, Sand Point, Idaho, Seattle, Arrowhead, B. C.

**Naugle Poles**

**Insure Your Overhead Lines**

BY SPECIFYING

**MacGillis**

NORTHERN or WESTERN

**CEDAR POLES**

PLAIN or BUTT-TREATED
FROM

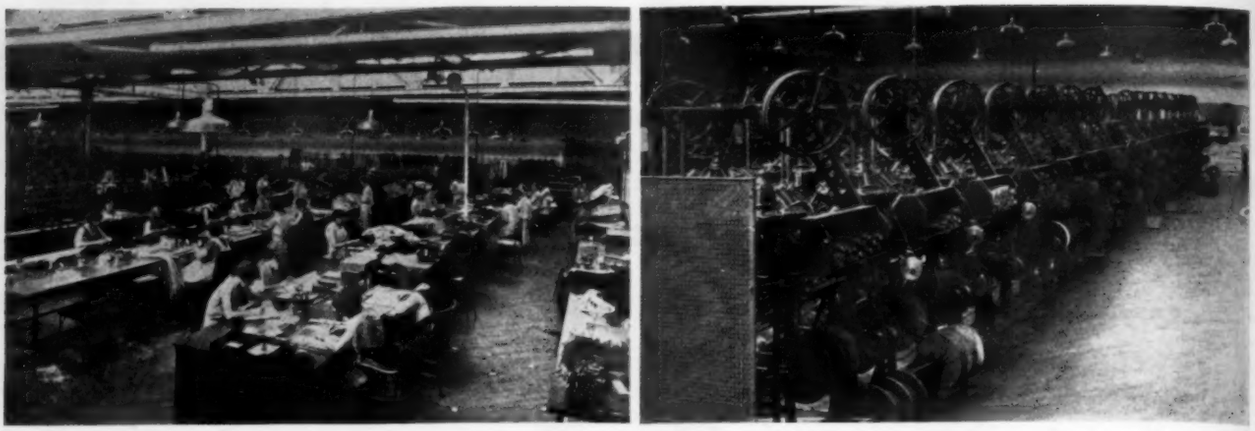
**MacGillis & Gibbs Co.**
120 E. Wisconsin Avenue
MILWAUKEE - WISCONSIN

**Bell Cedar Poles**
**Piling & Ties**
*Western Red - Northern White*
Creosote Butt Treating—Any Specification
Guaranteed N. E. L. A., W. R. C. A., N. W. C. A. Grades
Treating Plants and Concentrating Yards
Minnesota Transfer, Minn., Newport, Wash.
Other Concentrating Yards at British Columbia Points
There Are No Better Poles Than Those Produced by
**BELL LUMBER & POLE CO.**
Security Building Minneapolis, Minn.
Long Distance Phone Atlantic 2304

Takes the place of 6 men . . .
Simplex Pole Jack

Templeton, Kenly & Co., Ltd.
*Sole Manufacturers*
Established 1899 Chicago, Ill., U. S. A.
Foreign Distributors:
International Standard Electric Corporation
Northern Electric Company, Ltd.

**Cedar Poles**
Northern White Western Red
Plain or Treated Butts
*Prompt Shipment from Minneapolis Yard.*
**T. M. Partridge Lumber Co.**
Minneapolis, Minn.



*Cord department of the Stromberg-Carlson Company at Rochester. A new process installed giving superior cord at reduced prices.*

## STROMBERG-CARLSON DEVELOPS NEW PROCESS IN CORD MANUFACTURING

The fact that cords are an important feature in the telephone system warrants a good deal of attention being given to them. Much attention has been paid to cord manufacturing by the Stromberg-Carlson Telephone Manufacturing Company.

In addition to its highly developed switchboard cords, that company has always manufactured telephone instrument cords of a high quality. For some time the cord specialists employed by the company have been studying the possibilities of improving the instrument cords and at the same time effecting economies that could be passed on to operating companies.

Recently a new process incorporating patented features has been developed that produced a cord in many respects superior to that formerly manufactured at a lower cost than has been possible under the old process.

These cords contain the same Duratex braided conductors as the switchboard cords. The conductors are laid in parallel straight lay formation.

Along with the conductors, a sleeve is laid, which runs throughout the length of the cord. This sleeve is made of the same material as the outer braid. Around the conductors and sleeve, the outer cover is braided.

In making the cordage the braid is applied over any length. It is then cut into the required cord lengths, the braid stripped of the ends and bound. This leaves the conductor ends and sleeve free.

Tips are applied to the conductors, making a completely finished cord with a stay cord running the full length so that all strain is taken up by it. The sleeve is left in with the conductors and acts as a stay or pull cord, the advantage of this being that no stay cord has to be sewed on. The cord itself is smooth and flexible.

Production of cords by this method is simplified to the extent that one braider operator can produce many times more cords than by the old method. A reduction in the cost of manufacturing also is made possible, which results in a corresponding reduction in the price of cords to the ultimate consumer.

The simplicity of building cords out of this cordage should appeal to companies that finish their own cords and especially to those that use special lengths, or that need long lengths for extensions, etc.

## ADDITIONAL KELLOGG EQUIPMENT INSTALLED BY NEW YORK CENTRAL

It is reported that the New York Central Railroad has placed another order with the Kellogg Switchboard & Supply Company at Chicago for a No. 17-B magneto switchboard and subsets to better handle their station to station communications.

This type of Kellogg switchboard is used where the requirements are for more than fifteen lines and where the future growth is not expected to exceed thirty-four lines.

It is arranged to operate with any standard magneto telephone which is connected to binding posts located inside the cabinet.

The cabinet is beautifully finished in dark walnut and hinged to a back panel which opens outward, making all parts easily accessible.

This board can be easily mounted on the wall, desk or table, making a very neat and attractive installation, and furnishes efficient and dependable service at a low cost.

The line equipment consists of combined drops and jacks mounted in strips of ten and can be arranged for either code or regular night alarm. It enables the attendant to go about her duties in the building and be able to know when the calling party is trying to signal her or some other individual on the same line, by the code signals given from the night alarm buzzer.

*The No. 17-B Magneto Switchboard and subsets, the same as recently installed by the New York Central R. R.*

The code ringing night alarm feature is especially adapted to the requirements of the New York Central Railroad, as well as for rural communities with the usual heavy party line saturation.

## SUMMIT TO HAVE NEW TELEPHONE BUILDING

The New Jersey Bell Telephone Company expects to start construction of its new building in Summit, N. J., at the intersection of Springfield avenue and St. George's court, early this fall. The company has already tested soil conditions by digging a deep excavation.

The business office, now at 334 Springfield avenue, will not be moved into the new structure, as the present quarters are more centrally located, according to an official of the company.

A new long distance telephone office, involving an expenditure of $220,000, has been placed in service in Pomona, Calif.

## GEARED DOWN FOR SAFETY SAKE

In an effort to promote safety, speed governors have been installed on all motor cars and trucks of the Home Telephone & Telegraph Company, Ft. Wayne, Ind., officials of the company announced recently.

Governors installed on cars used in the city have been regulated to permit a maximum speed of 30 miles an hour. Cars in use outside the city will be unable to attain a speed of more than 40 miles an hour. The company operates 60 automobiles in installing and maintaining telephone service in and around Fort Wayne.

This safety precaution is in line with the company's policy to eliminate generally all hazards and dangers that cause injuries and in its automobile service to avert all possible traffic accidents. Recently the drivers of all Home Company cars were given an eye test to determine the fitness of each individual to operate a car.

The company maintains a safety committee which meets monthly to discuss all problems relative to the safety of the employes at their work. Frank X. Staub is chairman of this committee.

## UTILITIES ASSOCIATION ATTEMPTS TO SOLVE RURAL SERVICE PROBLEM

The Oklahoma Utilities Association of Oklahoma City recently sent a letter of inquiry relative to rural line service to fifty different state telephone association executives throughout the United States.

The purpose of the letter is to find the proper solution of the rural service problem. Questions which the executives were asked to answer according to their experience or investigations along this line were as follows:

1. What part of rural service in your state is furnished by company owned equipment and what part by subscribers' owned lines and equipment, commonly termed service lines?
2. What is the general practice of supplying rural service in your immediate community and your state as to construction, rates, mileage charges, zoning, etc.?
3. Do you believe that service rendered by company owned facilities exclusively with adequate rates to be the best solution of this problem?
4. If not, why do you consider it impracticable?
5. What is your idea of a proper zoning system for rural service supplied exclusively by company owned facilities?
6. Have you ever conducted a campaign of converting switched lines service (supplied by means of subscribers' owned equipment) to service and company owned lines and equipment?
7. If you have, please state, generally, methods and practices used in bringing about such a change.
8. If you have been successful in this respect, what special activity on your part contributed largely to your success?
9. If you did not bring about a satisfactory change, what in your opinion is wrong?

All helpful suggestions from you will be thankfully received and we will be glad to reciprocate in giving you the benefit of our investigations and study, as well as of results obtained.

## DELIVERY OF MANHATTAN DIRECTORIES REQUIRES 350 TRUCKS

An idea of the enormous number of directories required by big city telephone exchanges is gleaned from the fact that delivery of the 1,715,000 copies of the summer issue of the Manhattan telephone directory, New York City, necessitated 350 truck-loads.

More than 285,000 changes in names, addresses, or telephone numbers had to be made before the approximately 460,000 listings in the new book could be sent to press, thus involving changes in about 5% of the total number of listings, according to officials of the New York Telephone Company.

## NEW TELEPHONE PLANT WILL TRIPLE SPEED OF SERVICE

The Southeast Missouri Telephone Company of Cape Girardeau, Mo., recently moved into a new building where a new local and toll switchboard will enable the company to handle 700 calls an hour. Previously the operators were able to handle only 260 calls an hour. The Southeast Missouri Telephone firm was founded in 1898 with 500 telephones. Today it is a $3,000,000 concern with more than 20,000 telephones.

Almost a year was required to erect the new telephone structure, on which actual work was begun in June, 1929. The commercial department of the company moved into the new building more than two months before the switchboard was ready for occupancy. The first call over the new system was made by Mayor Edward L. Drum of Cape Girardeau to Gov. Henry S. Caulfield of Missouri, who was then attending a governors' conference at Cedar City, Utah.

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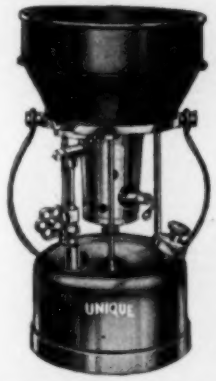


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## STROMBERG-CARLSON SALES INCREASE

(*Continued from page* 30.)

several years of uncertain operation, during which it seemed impossible that it would survive. That it did continue must ever remain as a tribute to the ambition and steadfast determination of its founders.

Four years later, in 1899, their plant was full of business and they were awarded a contract by the Home Telephone Company of Rochester, New York, predecessors of the Rochester Telephone Corporation, for the first units of its switchboard. One year later Rochester capitalists, seeing the possibilities in the business, bought control of the Stromberg-Carlson Telephone Manufacturing Company and moved the plant to Rochester and made it what it still is today—a Rochester owned and managed institution.

Since its existence the Stromberg-Carlson Company has supplied equipment for scores of farmer lines, small villages and towns, and has installed some of the largest manual switchboards in the world. It is considered one of the largest independent telephone manufacturers today.

The company maintains branches in Chicago at No. 17 S. Jefferson street, employing 50 persons, and in Kansas City. C. W. Schafer is Chicago Division Manager and in charge of the Chicago branch offices. A. J. Roberts is Manager and C. D. Kinne, Assistant Manager, respectively, of the Kansas City Branch.

The company owns the Stromberg-Carlson Telephone Mfg. Company of Canada, Ltd., located at Toronto; controls the Stromberg-Carlson Telephone Mfg. Company of Australia, situated at Sydney; controls the J. P. Stockton Phonograph Company of Newark, New Jersey, which has just developed a unique, compact and efficient automatic record shifter for radio-phonograph combinations; and controls Bludworth, Inc., of New York City, makers of voice reinforcement systems and sound reproducing systems with full remote control for churches, public rooms, hotels and large homes and estates.

The officers of the company are: President, W. Roy McCanne; Vice President in Charge of Sales, George A. Scoville; Vice President and Chief Engineer, Ray H. Manson; Vice President in Charge of Production, Edward A. Hanover; Vice President and Secretary, Wesley M. Angle.

## ESTIMATE STOCK VALUE UPON EARNINGS

A value of approximately $415 a share is given to American Telephone & Telegraph Company stock in an interesting analysis of the company just prepared by Jones, Miller & Company of Philadelphia.

"A number of statisticians," the bankers point out, "have arrived at a valuation of over $400 a share for A. T. & T. stock, figuring as follows: The Western Electric, A. T. & T.'s manufacturing subsidiary (which is 98 per cent. owned) for 1929 had gross sales of $410,949,817, as compared to gross sales for General Electric Company of $415,338,094. Figuring the current market price around $85 for General Electric figures approximately six dollars of market price for each dollar of gross sales.

"Figuring Western Electric on the same basis would make American Telephone's holdings worth over $200 per share on each share of A. T. & T. This would mean, therefore, that at its present price approximately $230, that the telephone equity in the company is selling for approximately $30 a share."


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**RECONSTRUCTED EQUIPMENT**

| | |
|---|---|
| Western Elec. No. 317 inside connection 3-bar 1000-1600 or 2500 ohm Bdg. compacts @ | $ 9.25 |
| Stromberg Carlson No. 896 5-bar 1600 ohm Bdg. compacts @ | 10.50 |
| Kellogg No. 28 desk set (old type heads) complete with W. E. 3-bar 1000-1600 or 2500 ohm external post connection signal set @ | 8.00 |
| Kellogg No. 28 desk set with unbreakable head complete with W. E. No. 315 inside connection 3-bar 1000-1600 or 2500 ohm signal set @ | 10.00 |
| Leich Elec. desk set complete with W. E. 3-bar 1000 or 1600 ohm external post connection signal set $7.75—4-bar @ | 8.75 |
| New Cabinet inside connection compacts with Kellogg or W. E. Transmitters & Rec. 3-bar 1000-1600 or 2500 ohm $9.50—4-bar @ $10.50—5-bar @ | 11.50 |
| Kellogg No. 79 C. B. Induction coils @ | .40 |
| Western Elec. No. 22 3-bar Bdg. Generators with cranks @ | 1.65 |
| Stromberg 4-bar A. C. or Pulsating current Gen. with crank @ | 2.25 |
| Automatic Elec. Slip type Receivers with New W. E. Shells & Cords @ | 1.10 |
| Kellogg Local or C. B. Transmitters complete with backs @ | 1.10 |
| Western Elec. No. 323 Transmitters complete with backs @ | 1.25 |
| Western Elec. No. 143 Receivers complete with cords @ | 1.25 |
| Western Elec. No. 240 External post connection 3-bar 1000-1600 or 2500 ohm Bdg. magneto hotel sets with W. E. Trans. & No. 122 Rec. @ | 5.75 |
| Western Elec. No. 240 external post connection 3-bar 1000-1600 or 2500 ohm desk set signal sets with No. 13 Ind. Coil @ | 4.50 |
| Western Elec. No. 315 inside connection 3-bar 1000-1600 or 2500 ohm desk set signal sets @ | 5.75 |

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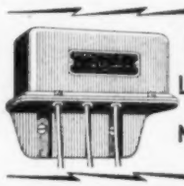
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**Western Electric Co. Apparatus**

| | |
|---|---|
| No. 323 Insulated Transmitters (with back and bolt) | $1.00 |
| No. 329 Insulated Transmitters (with back and bolt) | $1.00 |
| No. 21 2-MF Condensers | .50 |
| No. 20 Induction Coils | .35 |
| No. 1020-AL Desk Stands (complete) | 4.50 |
| No. 6 and No. 8 2500 ohm Biased Ringers | 1.00 |

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